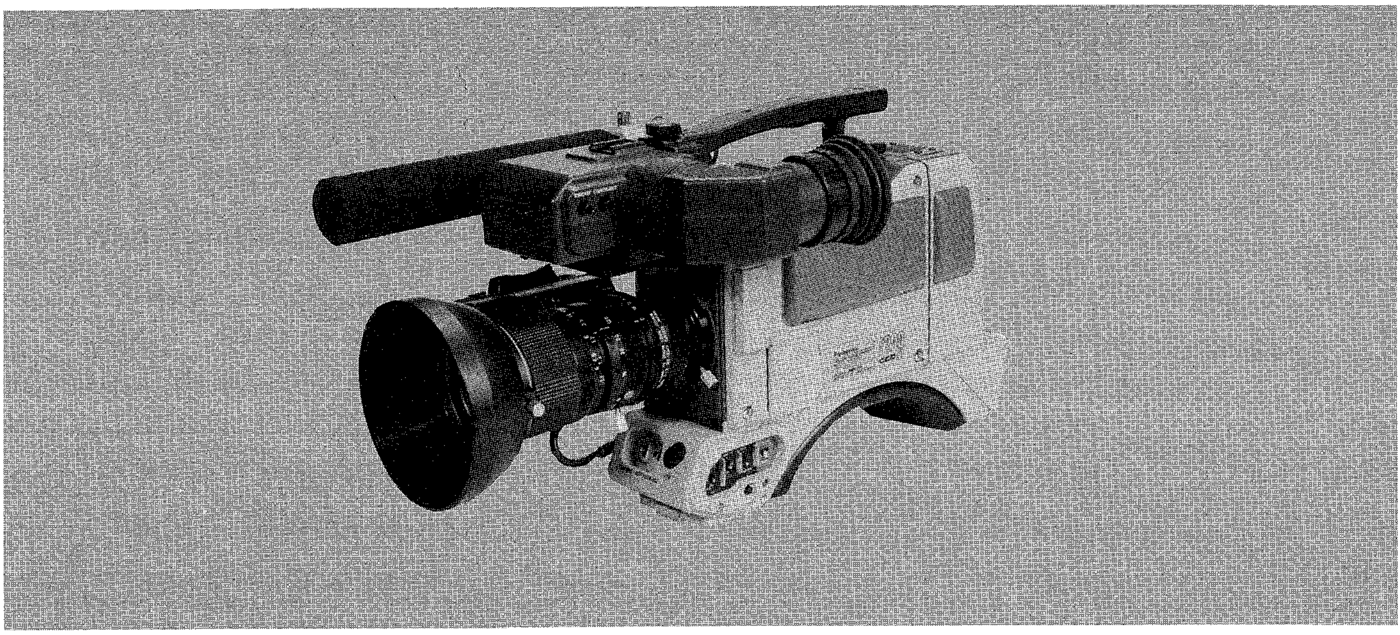
ORDER NO. AVS88032083C8

Service Manual

PAL Colour Video Camera

WV-F200 Series



Vol. 1
Vol. 2
Vol. 3
Vol. 4

CONTENTS

Vol. 1 Circuit Description .... 1-1 ~ 1-61
Vol. 2 Adjustment Procedure .... 2-1 ~ 2-41
Vol. 3 Block Diagrams/Schematic Diagrams/Conductor Views .... 3-1 ~ 3-43
Vol. 4 Replacement Parts List/Exploded Views .... 4-1 ~ 4-38

Panasonic

Matsushita Electric Industrial Co., Ltd.
Central P.O. Box 288, Osaka 530-91, Japan

Service Manual

PAL Colour Video Camera

WV-F200 Series

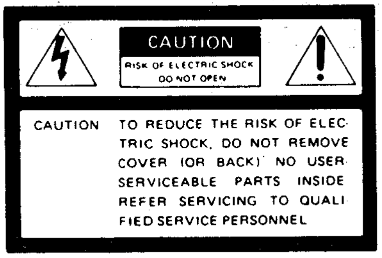
Vol. 1

Circuit Description

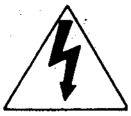
CONTENTS

- Specifications ..... 1-2 ~ 1-3
- Major Operating Controls and Their Functions ..... 1-4 ~ 1-13

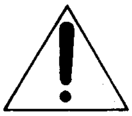
1. Outline ..... 1-14 ~ 1-17
2. CCD & Prism Assembly ..... 1-18 ~ 1-20
3. Preamplifier Board ..... 1-21 ~ 1-22
4. CCD Drive Board ..... 1-23 ~ 1-25
5. Process-1 Board ..... 1-26 ~ 1-31
6. Process-2 Board ..... 1-32 ~ 1-35
7. Encoder Board ..... 1-35 ~ 1-39
8. Detail Board ..... 1-40 ~ 1-42
9. Auto Board ..... 1-43 ~ 1-49
10. Power Board ..... 1-49 ~ 1-50
11. Shading Board ..... 1-51 ~ 1-52
12. Sync Board ..... 1-52 ~ 1-55
13. Mother Board ..... 1-56 ~ 1-57
14. Camera Adaptor ..... 1-58 ~ 1-60
15. 1.5" Electronic Viewfinder WV-VF38 ..... 1-60 ~ 1-61



CAUTION TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



This symbol warns the user that uninsulated voltage within the unit may have suificient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this unit.



This symbol alerts the user that important literature concerning the operation and maintenance of this unit has been included.
Therefore, it should be read carefully in order to avoid any problems.

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are shaded on the schematic diagram and indicate with " ⚠ " mark on the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards.
Do not modify the original design without permission of manufacturer.

SPECIFICATIONS

ENG Colour Camera WV-F200

Pick-up System:		Middle index prism system (F1.4)
Image Sensor:		Three 2/3" interline transfer CCDs Pixels: 500 (Horizontal) × 582 (Vertical)
Scanning Standard:		625 lines, 50 fields, 25 frames
Synchronizing System:		Internal or external (gen-lock), automatically switchable Internal: PAL standard External (gen-lock) Input: PAL composite (VBS) signal or black burst signal
Subcarrier Phase for Gen-lock:		Freely adjustable over 360°
Horizontal Phase for Gen-lock:		Adjustable from −0.1 µsec to +3.5 µsec.
Video Output		Three outputs (PAL composite, Y/C component switchable) 1.0 Vp-p PAL composite/75 ohms (BNC connector) 1.0 Vp-p PAL composite/75 ohms × 1 (32-pin VTR/RCU connector) 1.0 Vp-p luminance (Y) composite/75 ohms × 1 (32-pin VTR/RCU connector) 0.3 Vp-p burst level chrominance/75 ohms × 1 (32-pin VTR/RCU connector)
Auxiliary Input:		1.0 Vp-p composite/75 ohms through 32-pin VTR/RCU connector
Audio Input:		MIC: −70 dBm × 1 (XLR connector)
Audio Output:		−20 dBm or −60 dBm/unbalanced, switchable (32-pin VTR/RCU connector)
Illumination Required:		2000 lux at F5.0, 3200°K
Minimum Illumination:		30 lux at F1.7 with +18 dB gain, more than 70% output level
Signal-to-noise Ratio (Nominal):		54 dB (luminance) 2000 lux, F5.0 without gamma and aperture correction
Horizontal Resolution (at center):		600 lines
Registration:		0.05% (entire picture area, excluding lens)
Detail/Aperture:		Horizontal and vertical (2-line type)
White Balance:		Automatic white balance setting (AWC with two memories and Preset)
Black Balance:		Automatic with pulse canceller
Encoder:		Y,U,V
Colour Bar:		Built-in EBU colour bar generator
Colour Conversion Filters:		3200°K, 5600°K with 12.5% ND, 5600°K, Close
Maximum Cable Length:		VTR Cable: 30 m (no power supply via cable) 10 m (power supply through cable) 32-pin Studio Cable: Max. 300 m with cable compensator
Switches:	**Camera**	Power, Colour Bar/Camera Selection, High Gain Selection, White Balance Selection, Auto White/Auto Black Set, Level Indicator ON/OFF, VTR Start/Stop, Check, Lens Iris Selection, Detail Level Selection, Subcarrier Phase Coarse, Recording Time Reset
	Camera Adaptor:	VTR Compatibility, Audio Level Selection, Audio Monitor Selection, VTR Video Output Selection, Power Select
	Viewfinder	Peaking ON/OFF, Tally ON/OFF
	Zoom Lens (J12X10BKRSM)	Servo/Manual Zoom Selection, Servo Zoom Control, Iris Control Selection, Auto Iris, Return Video, Macro, VTR Start/Stop
Controls:	**Camera**	Total Pedestal, Red Gain, Blue Gain, Subcarrier Phase Fine, Horizontal Phase, Lens Iris
	Camera Adaptor	Audio Monitor/Intercom Level
	Viewfinder	Brightness, Contrast
Standard Lens (J12X10BKRSM):		12:1 auto iris servo control zoom lens, 10 — 120 mm with macro mode, F1.7
Lens Iris:		Automatic or manual
Lens Mount:		Bayonet mount for 2/3" pickup device
Lens Filter Size:		82 mm P=0.75
Viewfinder:		1.5" (1-3/8" actual image size) electronic viewfinder with character display and zebra level indicator
Power Source:		12 V DC, 5 sources as follows: (1) Battery Pack (2) AC Adaptor (3) External DC source through 4-pin DC connector (4) VTR (external AC adaptor) (5) Remote Control Unit through RCU

Battery Pack Operating Time:	Approximately 1 hour with WV-PS60	
	Approximately 2 hours with WV-PS33	
Power Consumption:	Camera Head	10.8 watts (12 V DC, 0.9 A)
	ENG Configuration	14.4 watts (12 V DC, 1.2 A)
	Studio Configuration	22.8 watts (12 V DC, 2A)
Ambient Operating Temperature:	−5°C — +45°C	
Ambient Operating Humidity:	30 % — 90 %	
Dimensions:	Camera Head Only	173(W) × 257(H) × 330(D) mm
	ENG Configuration (with WV-PS60)	249(W) × 257(H) × 520(D) mm
	Studio Configuration	195(W) × 464(H) × 550(D) mm
Weight:	Camera Head only	3.5 kg (7.7 lbs)
	ENG Configuration	6.4 kg (14.1 lbs)
	Studio Configuration	8.4 kg (18.5 lbs)

Dimensions and weights are approximate.
Specifications are subject to change without notice.

SYSTEM ACCESSORIES

- COLOUR CAMERA WV-F200H
  - Camera Head WV-F200H .... 1 set
  - Camera Adaptor WV-AD42A .... 1 set

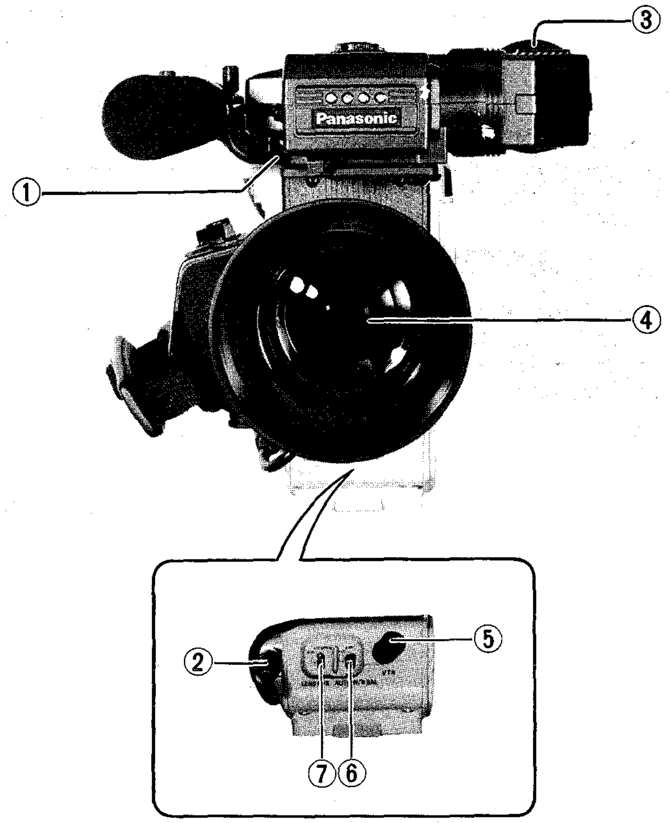
- COLOUR CAMERA WV-F200
  - Camera Head WV-F200H .... 1 set
  - Camera Adaptor WV-AD42A .... 1 set
  - 1.5″ Electronic Viewfinder WV-VF38 .... 1 set
  - 12X Servo Control Zoom Lens J12X10BKRSM 1 set
  - Microphone WV-MC35 .... 1 set
  - Tripod Mounting Adaptor WV-Q47 .... 1 set
  - Carrying Case WV-CC37 .... 1 pc.

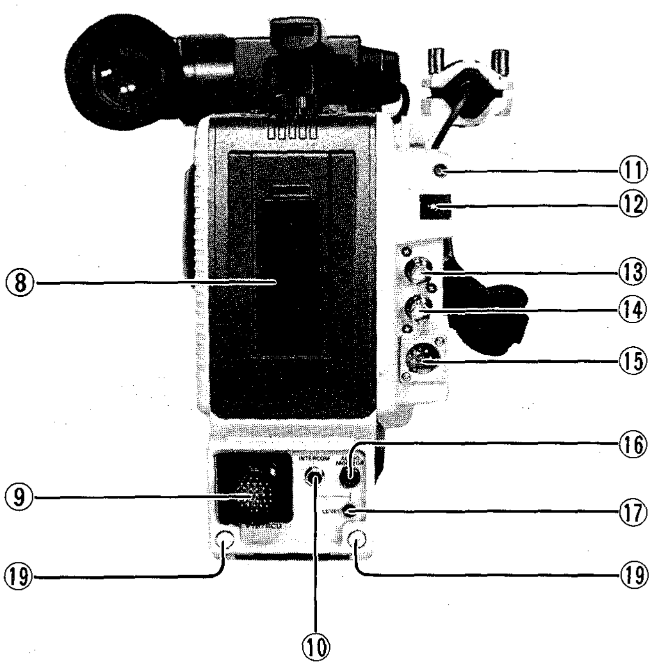
- U10M MAIN OPTIONAL ACCESSORIES
  - 1.5″ Electronic Viewfinder WV-VF38
  - 5″ Electronic Viewfinder WV-VF65B
  - Remote Control Unit (RCU) WV-RC36
  - Unidirectional Electret Condenser Microphone WV-MC35
  - 12X Servo Control Zoom Lens J12X10BKRSM
  - Lens Control Kit WV-LK35
  - Tripod Mounting Adaptor WV-Q47
  - AC Adaptor/Charger WV-PS31
  - Battery Pack (1.65 Ah) WV-PS60
  - Battery Pack (3.5 Ah) WV-PS33
  - Battery Charger DE-1232 (for WV-PS60)
  - Battery Charger WV-BC30 (for WV-PS33)
  - MII Format VTR Adaptor WV-VT10
  - Battery Adaptor WV-AD19

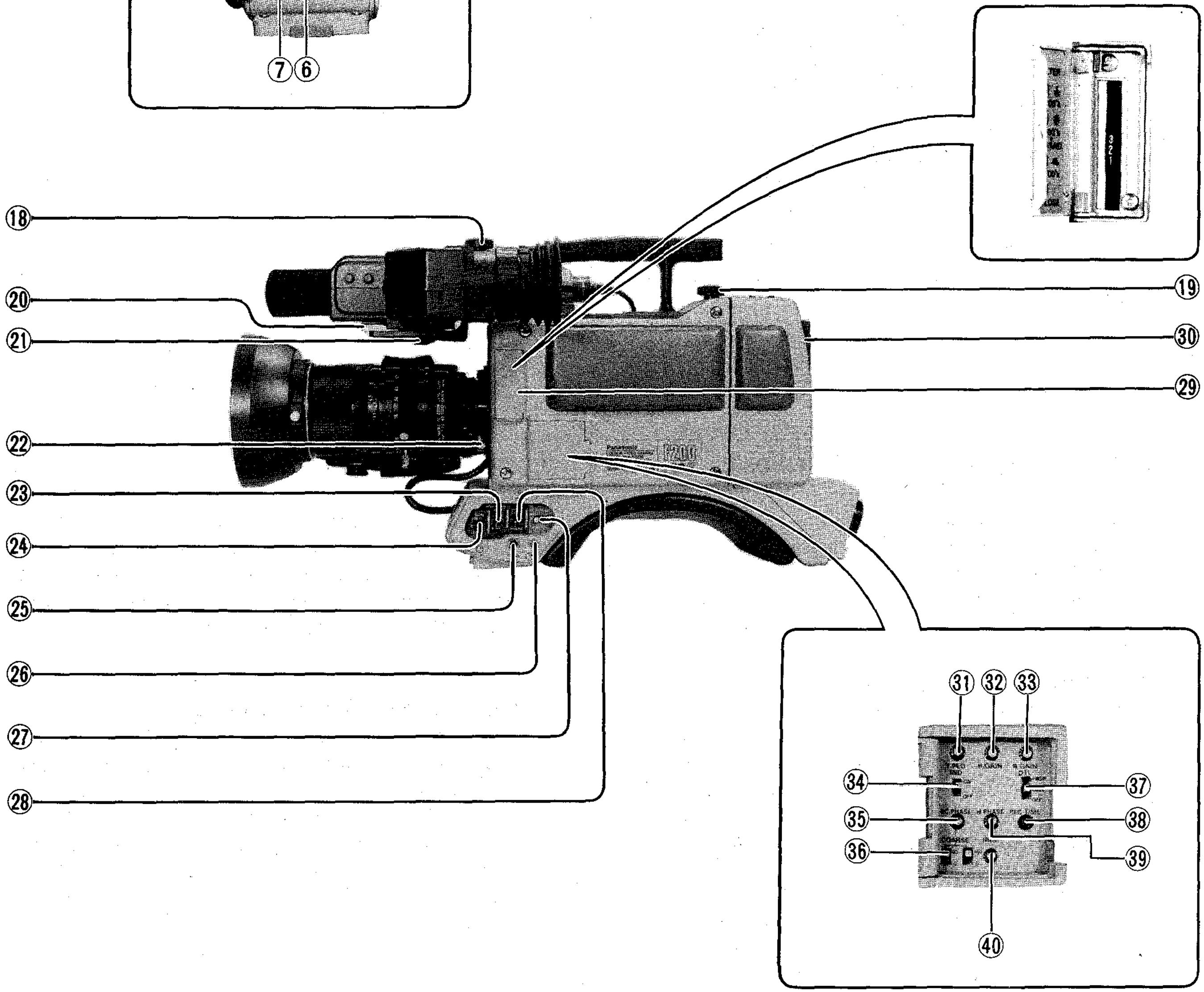
- OTHER OPTIONAL ACCESSORIES
  - VTR Cable: WV-CA32/10 (32P-10P) .... 3 m (10 ft)
    WV-CA32A/14 (32P-14P) ..... 3 m (10 ft)
  - 10-pin VTR Extension Cable:
    10H-30AS .... 10 m (30 ft)
    10H-50AS .... 17 m (50 ft)
  - Studio Cable: 32A-25 .... 8 m (25 ft)
    32A-50 .... 17 m (50 ft)
    32A-100 .... 30 m (100 ft)
  - Lens Connector Conversion Cable WV-LC10

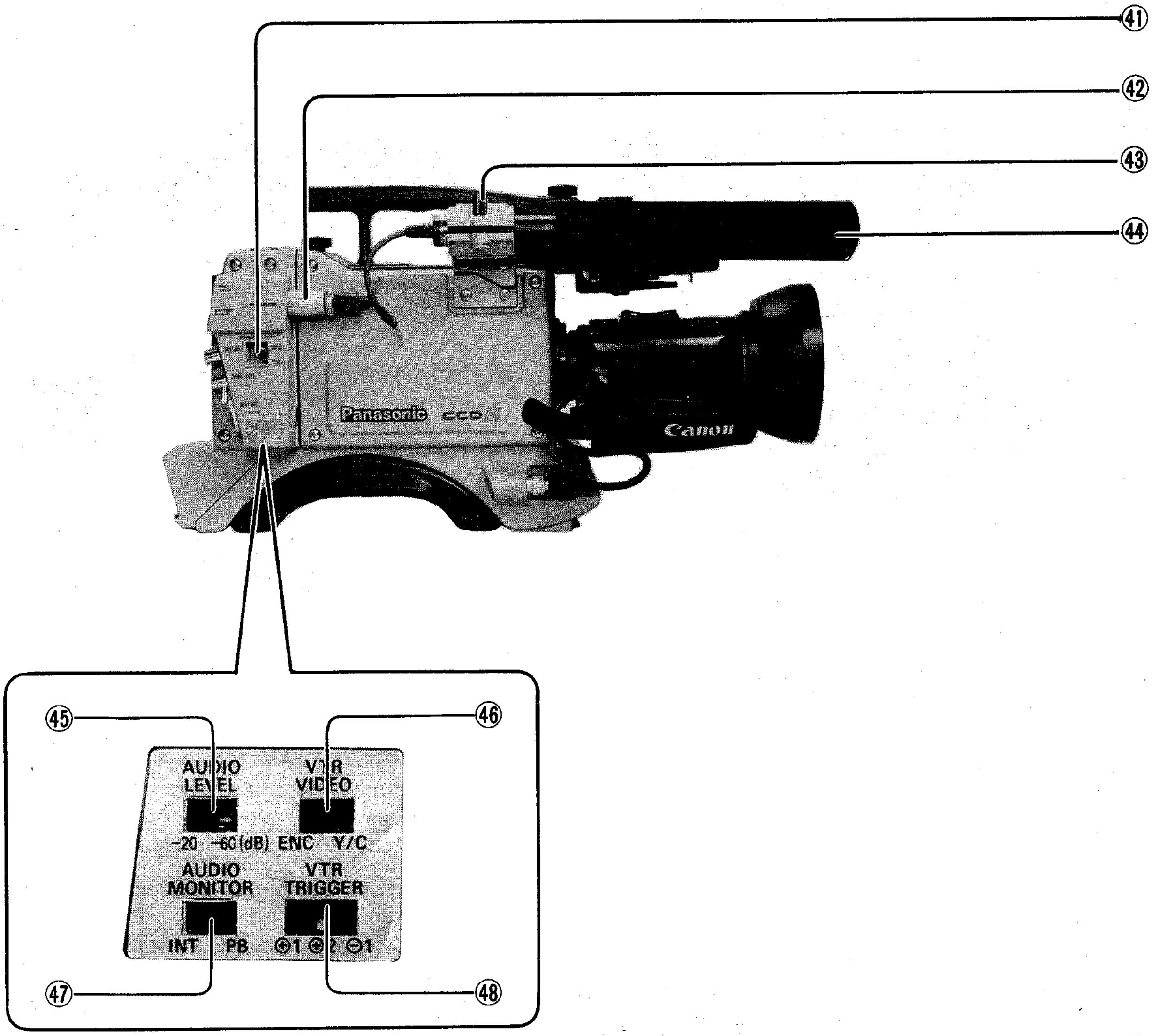
MAJOR OPERATING CONTROLS AND THEIR FUNCTIONS

ENG Colour Camera System, WV-F200 Series


①
②
③
④
⑤
⑥
⑦
Panasonic


⑧
⑨
⑩
⑪
⑫
⑬
⑭
⑮
⑯
⑰
⑲
⑲


⑱
⑲
⑳
㉑
㉒
㉓
㉔
㉕
㉖
㉗
㉘
㉙
㉚
㉛
㉜
㉝
㉞
㉟
㊱
㊲
㊳
㊴
㊵
F200



1. **Viewfinder Connector (12-pin) (VIEWFINDER)**
   Connect the viewfinder cable from the 1.5" or 5" Electronic Viewfinder to this connector.
   Note: When connecting the 5" Electronic Viewfinder WV-VF65B) to this connector, use the Viewfinder Conversion Cable supplied with the WV-VF65B.

2. **Lens Connector (12-pin) (LENS)**
   Connect the lens cable to this connector.
   Note: If the Auto Iris Servo Control Zoom Lens with an 8-pin connector is to be used, the optional Lens Connector Conversion Cable WV-LC10 is required. This will allow proper matching of the 8-pin connector of the lens with the 12-pin connector of the camera.

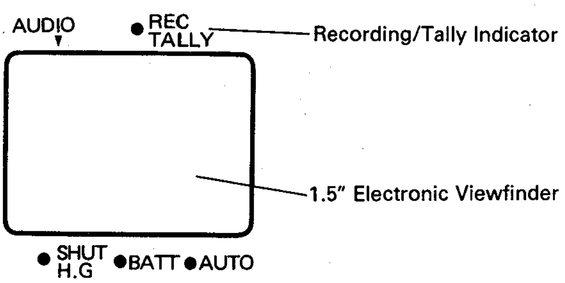
3. **1.5" Electronic Viewfinder**
   This small 1.5" (1-3/8" actual image size) monitor shows exactly the image picked up by the lens. The viewfinder can be tilted 90° from horizontal and it is adjustable up and down by approximately 13/16" (20 mm). Further, the viewfinder may be slid laterally by up to 1-3/4" (45 mm) and 13/16" (20 mm) back and forth.

4. **Auto Iris Servo Control Zoom Lens**
   This is a high-quality 10 — 120 mm lens offering automatic as well as manual iris control and servo control zoom. The lens features a bayonet mount and F1.7 maximum aperture. Picture size may be magnified by up to 12 times through use of the zoom feature. Simply rotate the zoom/macro ring for close-up or wide angle recording. Macro shooting is possible of objects up to 1 cm (3/8") from the lens surface.

5. VTR Start/Stop Button (VTR) (parallel operation)

This button is used to change the recorder mode from pause (Recording Pause) to recording and functions in the same way as the VTR Start/Stop Button (75) on the lens. Press once to start recording.

While recording, the Tally indicator in the viewfinder lights and the Tally Light (51) on the viewfinder also lights.



When the button is pressed once more, the recorder is set to the Pause mode (Recording Pause), and the Recording/Tally indicator and Tally Light will go off.

Note: If the attached zoom lens features a lock-release type VTR start/stop button, this VTR Start/Stop button functions only when the corresponding button on the lens is released.

6. Auto White/Auto Black Set Switch (AUTO W/B BAL AWC/HOLD/ABC)

This switch sets the white balance and black balance automatically as follows:

AWC: This position is used for setting the white balance when the White Balance Selection Switch ㉓ is set to the AWC A or AWC B position. White balance adjustment is required when "AWC A NG" or "AWC B NG" starts blinking in the viewfinder or when the Auto Warning Indicator in the viewfinder lights.
Two white balance settings for two light sources, such as indoor and outdoor, can be retained in the memory. In this case both the AWC A and AWC B positions are used.

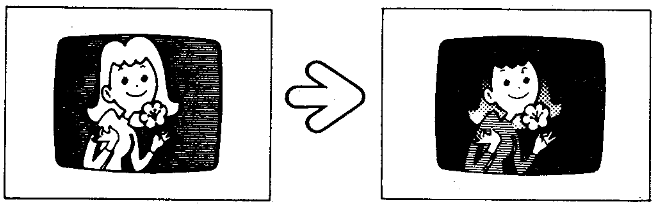
HOLD: In this position, the white and black balances set at the AWC or ABC position can be held fixed if so desired for at least one year.

ABC: This position is used for setting the black balance. Black balance adjustment is required when "ABC NG" starts blinking in the viewfinder or when the Auto Warning Indicator in the viewfinder lights.

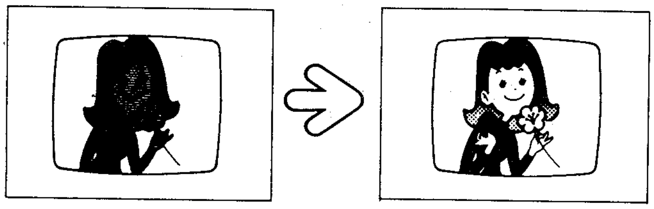
Note: Since the black balance adjustment always is performed automatically first at 0 dB gain and then at +18 dB gain, the picture will flash in the viewfinder while the black balance is being set. This flashing will help inform you of present adjustment, so as not to confuse the image with a high gain setting of the High Gain selection switch (0 dB or 18 dB).

7. Lens Iris Selection Switch (LENS IRIS; 1/2 OPEN/NOR/1/2 CLOSE)

This switch can be used to set the lens iris opening to compensate for unusual lighting conditions. If the object is brightly lit against a dark background, set this switch to the 1/2 CLOSE position. This will close the lens iris by a 1/2 F-stop.



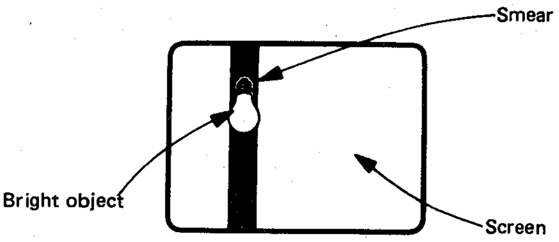
If the object is relatively dark and the background is bright, set the switch to the 1/2 OPEN position. This will open the lens iris by a 1/2 F-stop.



At the normal (NOR) position, the lens is operating with normal lens iris openings.

Note:

1) If this switch is used, be sure to return it to the detent NOR position after use.
2) If the camera is aimed at an extremely bright object, such as the sun or a lamp, vertical bars (i.e. smear) may appear in the picture. This is a peculiar phenomenon of the CCD and is quite normal. Try as much as possible to avoid shooting scenes with extremely bright light, as this could also be harmful to the camera.

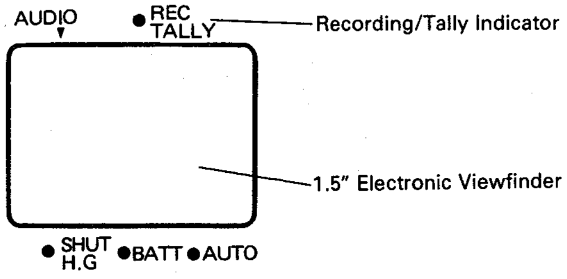


3) Set this switch to the NOR position when the camera is used together with the Remote Control Unit (RCU).
4) If a zoom lens with an 8-pin connector is used, the Lens Connector Conversion Cable WV-LC10 must also be used. In this case the lens iris selection switch may be effective by setting the iris selection switch on the lens to the R (Remote) position.

5. VTR Start/Stop Button (VTR) (parallel operation)

This button is used to change the recorder mode from pause (Recording Pause) to recording and functions in the same way as the VTR Start/Stop Button (75) on the lens. Press once to start recording.

While recording, the Tally indicator in the viewfinder lights and the Tally Light (51) on the viewfinder also lights.



When the button is pressed once more, the recorder is set to the Pause mode (Recording Pause), and the Recording/Tally indicator and Tally Light will go off.

Note: If the attached zoom lens features a lock-release type VTR start/stop button, this VTR Start/Stop button functions only when the corresponding button on the lens is released.

6. Auto White/Auto Black Set Switch (AUTO W/B BAL AWC/HOLD/ABC)

This switch sets the white balance and black balance automatically as follows:

AWC: This position is used for setting the white balance when the White Balance Selection Switch ㉓ is set to the AWC A or AWC B position. White balance adjustment is required when "AWC A NG" or "AWC B NG" starts blinking in the viewfinder or when the Auto Warning Indicator in the viewfinder lights.
Two white balance settings for two light sources, such as indoor and outdoor, can be retained in the memory. In this case both the AWC A and AWC B positions are used.

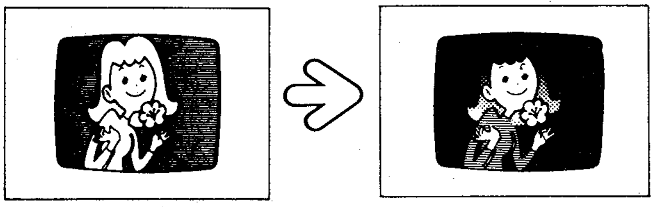
HOLD: In this position, the white and black balances set at the AWC or ABC position can be held fixed if so desired for at least one year.

ABC: This position is used for setting the black balance. Black balance adjustment is required when "ABC NG" starts blinking in the viewfinder or when the Auto Warning Indicator in the viewfinder lights.

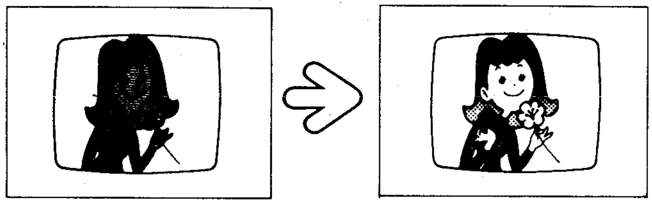
Note: Since the black balance adjustment always is performed automatically first at 0 dB gain and then at +18 dB gain, the picture will flash in the viewfinder while the black balance is being set. This flashing will help inform you of present adjustment, so as not to confuse the image with a high gain setting of the High Gain selection switch (0 dB or 18 dB).

7. Lens Iris Selection Switch (LENS IRIS; 1/2 OPEN/NOR/1/2 CLOSE)

This switch can be used to set the lens iris opening to compensate for unusual lighting conditions. If the object is brightly lit against a dark background, set this switch to the 1/2 CLOSE position. This will close the lens iris by a 1/2 F-stop.



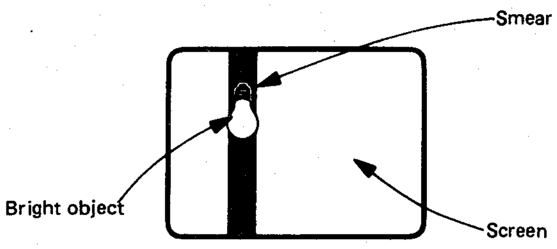
If the object is relatively dark and the background is bright, set the switch to the 1/2 OPEN position. This will open the lens iris by a 1/2 F-stop.



At the normal (NOR) position, the lens is operating with normal lens iris openings.

Note:

1) If this switch is used, be sure to return it to the detent NOR position after use.
2) If the camera is aimed at an extremely bright object, such as the sun or a lamp, vertical bars (i.e. smear) may appear in the picture. This is a peculiar phenomenon of the CCD and is quite normal. Try as much as possible to avoid shooting scenes with extremely bright light, as this could also be harmful to the camera.



3) Set this switch to the NOR position when the camera is used together with the Remote Control Unit (RCU).
4) If a zoom lens with an 8-pin connector is used, the Lens Connector Conversion Cable WV-LC10 must also be used. In this case the lens iris selection switch may be effective by setting the iris selection switch on the lens to the R (Remote) position.

8. **Battery Pack Mounting Angle**
Mount the Battery Pack WV-PS60/WV-PS33 or the AC Adaptor/Charger WV-PS31 on the camera by sliding it down along this mounting angle.

9. **VTR/RCU Connector (32-pin) (VTR/RCU)**
When using the camera together with a Panasonic portable colour VTR, the supplied VTR cable should be connected between the camera and VTR. This connector is also used for connection of the 32-pin studio cable from the Remote Control Unit (RCU) for comprehensive system operation. When connecting the 32-pin studio cable to this connector, the camera is automatically set to the RCU operation mode.
1/2"VHS and 3/4" U-vision portable VTR (10-pin)
WV-CA32/10 (32P-10P cable)
3/4" U-vision portable VTR (14-pin)
WV-CA32A/14 (32P-14P cable)

10. **Intercom Jack (M6) (INTERCOM)**
This jack is used for communication between the camera operator and operators of the RCU and Special Effect Generator in the system.

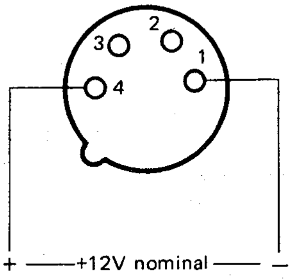
11. **Recording/Tally Indicator (red) (REC TALLY)**
This indicator lights when the camera is set to the recording mode (through the VTR Start/Stop button), and informs the person concerned of scenes being recorded.
The Tally indicator also lights when the camera is in full system operation together with the Remote Control Unit and Special Effects Generator.
In case a tape is not loaded or the tape end is reached, or if the servo mechanism is working improperly, this indicator will start blinking to warn the operator of such faults.

12. **Battery Connector (BATTERY)**
Connect the cord from the Battery Pack to this connector.

13. **Gen-lock Input Connector (BNC) (GEN-LOCK)**
The colour video signal of the camera is automatically synchronized to the gen-lock signal (composite or black burst) which is supplied to this connector. The gen-lock signal is used for system reference, such as when using the Special Effects Generator.
Caution: If the gen-lock signal is jittery (such as when obtained from VTR playback), the camera may not be able to synchronize properly.

14. **Video Output Connector (BNC) (VIDEO OUT)**
A composite video signal is provided at this connector.

15. **External DC Input Connector (XLR, 4-pin) (EXT DC)**
This connector accepts the power cable from an external DC source supplying nominal power of 12 V, 1.5 A (a belt type battery or car battery for example). This connector also accepts the power cable from an AC adaptor. For driving the studio configuration, a 12 V DC, 2.5 A power source is required.



16. **Audio Monitor Jack (M3) (AUDIO MONITOR)**
When an earphone is connected, the sound picked up through the microphone ㊹ or played back audio on the 3/4" U-vision recorder connected to the camera through the 14-pin camera connector can be monitored. Selection of the audio source is enabled by the Audio Monitor Selection switch ㊼.

17. **Audio Monitor/Intercom Level Control (LEVEL)**
Use this control to freely adjust the volume level in the earphone connected to the Audio Monitor Jack ⑯ or the headset connected to the Intercom Jack ⑩.

18. **Viewfinder Height Adjustment Knob (UP/DOWN)**
The height of the viewfinder can be adjusted by turning this knob. Adjustment of up to 13/16" (20 mm) is possible.

19. **Camera Adaptor Holding Screw/Knob**
The camera adaptor can be removed from the camera after loosening the two screws on the rear of the camera and one knob on the top of the camera. The camera adaptor has been pre-installed at the factory.

20. **Viewfinder Mounting Base**
The 1.5" Electronic Viewfinder WV-VF38 is mounted on the camera by first installing this base on the camera.

21. Viewfinder Lock Lever
The viewfinder is locked and released through use of this lever.
When the lever is released, the viewfinder can be slid approximately 1-3/4" (45 mm) laterally and 13/16" (20 mm) back and forth. Be sure to lock the lever after having adjusted the viewfinder position.

22. Lens Hold Ring/Knob
Turn this ring/knob clockwise to secure the lens to the camera.

23. White Balance Selection Switch (WHITE BAL; AWC A/B/P.SET)
This switch is used to select the white balance mode as follows:

AWC A: The white balance can be set automatically by pressing the Auto White/Auto Black Set Switch ⑥ upwards. The setting is stored in memory A.

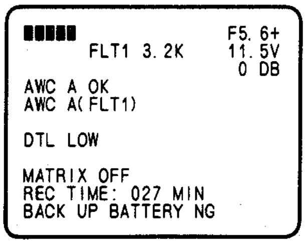
AWC B: Similar to AWC A, but the setting is stored in memory B.

P.SET: (preset) Proper white balance is achieved for 3200°K colour temperature and with the Filter Wheel ㉙ set to position 1.

Note:
1) Two white balance settings, one each for different lighting conditions such as indoor and outdoor, may be stored in the two memories AWC A and AWC B.
2) This switch should be set to the AWC A or AWC B position when the RCU is used.

24. High Gain Selection Switch (GAIN +9 dB/0/+18 dB)
Normally set this switch to the 0 dB position. Positions +9 dB and +18 dB increase the video output amplitude for dark scenes and are equivalent to opening the lens iris 1.5 or 3 F-stops, respectively.

25. Check Button (CHECK)
The operating conditions of the camera can be displayed on the viewfinder by keeping this button pressed.



```
▮▮▮▮▮              F5.6+
        FLT1 3.2K  11.5V
                    0 DB
AWC A OK
AWC A(FLT1)

DTL LOW

MATRIX OFF
REC TIME: 027 MIN
BACK UP BATTERY NG
```

26. Power Indicator (POWER)
This indicator lights red when the camera is operating. When the camera is in the standby mode, the indicator lights green.

27. Power Switch (DC POWER; OFF/STANDBY/ON)
This switch selects the operating mode of the camera as follows:

OFF: Power to the camera is turned off.

STANDBY: The main camera circuit is turned off. The heater of the CRT viewfinder is on, however. The Power Indicator ㉖ lights green at this position.

ON: The unit is in the operating condition after necessary adjustments have been made. The Power Indicator lights red.

Note: This switch should be set to the ON position when the camera is used with the Remote Control Unit (RCU).

28. Colour Bar/Camera Selection Switch (BAR/CAMERA)
This switch selects the video output signal as follows:

BAR: An EBU colour bar is provided from the Video Output connector ⑭ and the VTR/RCU connector ⑨.

CAMERA: The actual picture as picked up through the lens is displayed.

Note: This switch is inoperative when the RCU is used.

29. Filter Wheel
To set the filter wheel, flip open the cover.
The filter wheel is a four-position wheel which controls two built-in colour temperature conversion filters and one ND filter.

(1) 3200°K — indoor light (tungsten, halogen, quartz lamps)
(2) 5600°K +12.5% ND — daylight (sunny)
(3) 5600°K — daylight (cloudy/rainy)
(4) Closed

Select the position according to the light source (see page 41). The position of the filter wheel is displayed in the viewfinder when the CHECK button ㉕ is pressed.

30. Camera Adaptor
The camera adaptor is pre-installed on the camera at the factory. The adaptor is required for ENG, EFP and studio applications. It should be removed if the camera is to be used with MII format portable VTRs. This will allow mounting the MII VTR adaptor WV-VT10 on the camera.

31. Total Pedestal Level Control (T.PED)

This control can adjust the pedestal level of the video signal (luminance) for matching the pedestal level of more than two cameras in the system. Use a waveform monitor or oscilloscope for precise adjustment.

32. Red Gain Control (R.GAIN)

This control only works when the White Balance Selection switch ㉓ is set to the AWC A or AWC B position. The control is used to match the red gain with the colour signals of other cameras in the system. The red gain should be adjusted only after the white balance adjustment has been performed.

33. Blue Gain Control (B.GAIN)

This control only works when the White Balance Selection switch ㉓ is set to the AWC A or AWC B position. The control is used to match the blue gain with the colour signals of other cameras in a system. The blue gain should be adjusted only after the white balance adjustment has been performed.

Note: The Red and Blue Gain controls ㉜ & ㉝ cannot be operated when the White Balance Selection switch ㉓ is set to P.SET.
Be sure to set the Red and Blue Gain controls to the center positions before adjusting the white balancing. Otherwise, the control range of each control will be unbalanced.

34. Level Indicator ON/OFF Switch (LEVEL IND ON/OFF)

When this switch is set to ON, picture images exceeding the specified level (0.7 Vp-p) will produce a zebra pattern in the viewfinder.

If the background is bright and the object appears too dark in the automatic iris control mode, the lens iris should be adjusted manually until the zebra pattern barely appears. If the zebra pattern is visible, overexposure of the background will take place.

When in the automatic iris control mode, set this switch to OFF.

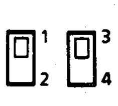
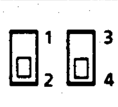
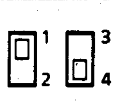
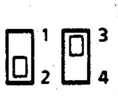
35. Subcarrier Phase Fine Control (SC PHASE)

This control allows fine adjustment of the subcarrier phase set by the Subcarrier Phase Coarse Switches ㊱. The control allows continuous control of up to +90° subcarrier phase to match the phase of the subcarrier signal obtained at the Gen-Lock Input connector ⑬.

This control should be adjusted together with the Subcarrier Phase Coarse switches ㊱ when the camera is used in a system configuration including the Special Effects Generator.

36. Subcarrier Phase Coarse Switches (SC PHASE COARSE)

The subcarrier phase of the camera signal can be adjusted from 0° to 360° in 90° steps with these switches, as shown below, for matching the phase of the subcarrier signal at the Gen-Lock Input connector ⑬. These switches should be set when the camera is used in a system configuration with the Special Effects Generator.

Subcarrier Phase	0°	90°	180°	270°
Position of Switches				

37. Detail Level Selection Switch (DTL HIGH/LOW/OFF)

The detail/aperture level can be selected by this switch in three steps. Set the switch to the desired position while observing the sharpness of the picture.

38. Recording Time Reset Button (REC TIME)

The accumulated recording time is displayed in the viewfinder under REC TIME while the CHECK button ㉕ is pressed. The time can be reset to "0 MIN" by pressing this button. Thus, total recording time can easily be checked by pressing this button at the outset of a new recording.

Note: For studio application, the time the Tally light lights is accumulated in the viewfinder REC TIME display.

39. Horizontal Phase Control (H.PHASE)

The horizontal phase of the camera signal can be adjusted to match the horizontal phase of the signal at the Gen-Lock Input connector ⑬.

This control should be adjusted when the camera is used in a system configuration with the Special Effects Generator.

40. Lens Iris Control (IRIS)

The auto iris level can be adjusted by this control. When replacing the lens, check the output signal of the camera and make necessary adjustment with this control if this is required.

Note: If a zoom lens with an 8-pin connector is used, the Lens Connector Conversion Cable WV-LC10 must also be used. In this case the lens iris control will have no effect. If such adjustment should be necessary, please use the lens iris control on the lens.

41. Power Selection Switch
(POWER SELECT BATT/EXT DC-VTR/RCU)

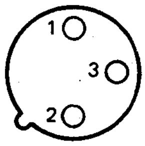
Using this switch, the desired power source connected to the camera may be freely selected.

BATT/EXT DC: This position is used for power supply from the battery pack, an external DC source or through an AC adaptor.

VTR/RCU: This position is used when power is to be supplied through the 32-pin connector from the VTR or the Remote Control Unit (RCU).

42. Microphone Connector (XLR, 3-pin)
(MICROPHONE)

Connect the cord from the optional microphone WV-MC35 to this connector.



1 : Shield for 2
2 : Hot
3 : Cold

Note: Pins 1 and 3 are connected internally.

43. Microphone Holding Knobs

To secure the microphone, turn these knobs clockwise.

44. Microphone

This is an unidirectional monaural electret condenser microphone. The microphone is highly sensitive to sounds coming from in front of it. The output level of the microphone is approximately −70 dB.

45. Audio Level Selection Switch
(AUDIO LEVEL −20/−60 dB)

Two audio output levels to the VTR can be selected: −20 dB or −60 dB. The camera has been preset to −20 dB at the factory.

46. VTR Video Output Selection Switch
(VTR VIDEO ENC-Y/C)

This switch selects the video output signal supplied at the VTR/RCU connector ⑨.

ENC: A composite video signal is supplied for 1/2" VHS and 3/4" U-vision portable VTRs.

Y/C: A component signal (luminance (Y) and chrominance (C) signals) are supplied for S-VHS VTRs.

Note:

1) If this switch is set to the Y/C position, when a recorder other than an S-VHS recorder is used, colour recording cannot be made.
2) The camera has been preset to the ENC position at the factory.

47. Audio Monitor Selection Switch (INT/PB)

This switch selects the audio signal from the Audio Monitor jack ⑯ to be monitored.

INT: The sound picked up by the microphone can be monitored.

PB: The played back audio portion from the 3/4" U-vision recorder, obtained through the 14-pin camera connector, can be monitored.

Note: The camera has been preset to the INT position at the factory.

48. VTR Compatibility Switch (⊕1/⊕2/⊖1)

Set this switch according to the VTR which is connected to the camera.

⊕1: For 1/2" VHS VTRs.

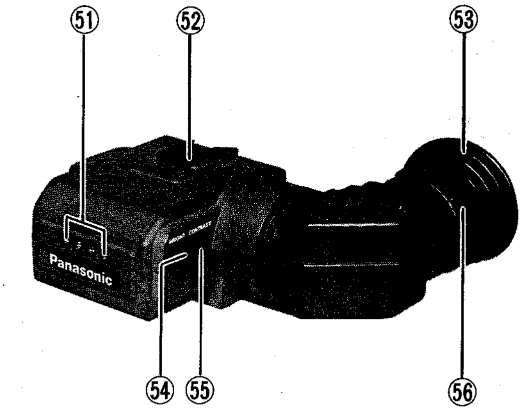
⊕2: For 3/4" U-vision VTRs, connected to the camera using a 14-pin connector.

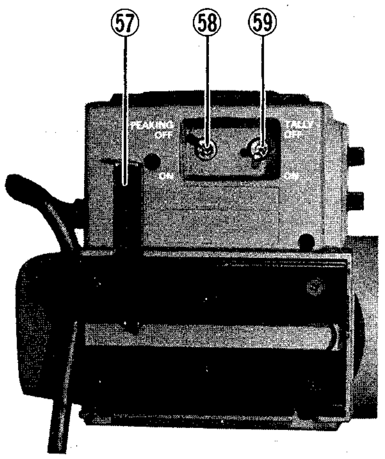
⊖1: If a VTR of other manufacture is used, and if this VTR pauses when the tape should be running and vice versa, this switch should be set to this position.

Note:

1) The switch has been preset to the ⊕1 position at the factory.
2) Some VTRs may not operate properly when connected to this camera, even though the setting of this switch is changed. Please consult your dealer for further information.

1.5" Electronic Viewfinder WV-VF38





51. **Tally Light**
This light is lit when the Tally ON/OFF switch (59) is set to ON and the camera has been set to the recording mode with the VTR Start/Stop switch.
The Tally light indicates that recording is in progress.

52. **Accessory Shoe**
Allows convenient mounting of a light source, for effective illumination of the scene.

53. **Eye Cap**
The eye cap besides blocking out stray light, offers comfortable viewing of the monitor picture. The cap may be flipped open if this is desired.

54. **Brightness Control (BRIGHT)**
Turn this control clockwise to increase the brightness of the picture in the viewfinder.

55. **Contrast Control (CONTRAST)**
Turn this control clockwise to increase the contrast of the picture in the viewfinder.

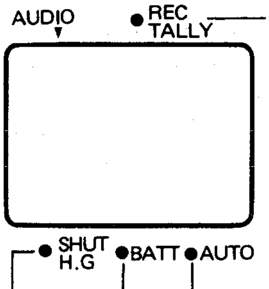
56. **Diopter Adjustment Ring**
Rotate this ring for optimum diopter setting.

57. **Viewfinder Side Stopper**
When removing the viewfinder from the camera, first release the Viewfinder Lock lever ㉑ and then slide the viewfinder to the right (as viewed from the front) while pulling this stopper.

58. **Peaking ON/OFF Switch (PEAKING ON/OFF)**
Normally this switch should be set to OFF.
However, when shooting under low light conditions, setting this switch to ON, will facilitate easy focusing adjustment.

59. **Tally ON/OFF Switch (TALLY ON/OFF)**
This switch turns ON/OFF the Tally Light (51) located on front of the viewfinder.

LED Indicators in the Electronic Viewfinder



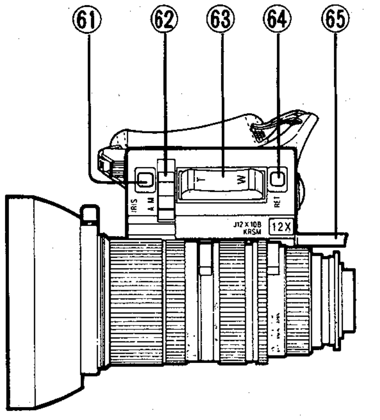
Recording/Tally Indicator (Red)
This indicator lights when the camera is set to the recording mode by pressing the VTR Start/Stop switch.
When using the camera with a 3/4" U-vision recorder through use of the 14-pin camera connector, if a video tape is not loaded, the tape end is reached or the servo mechanism is not working properly, this indicator blinks to warn the camera operator.

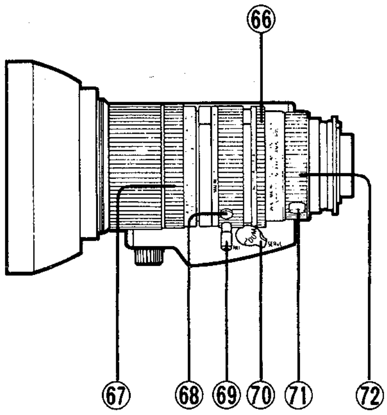
Auto Warning Indicator (Green)
This indicator blinks while the white balance or black balance is being automatically set. This indicator lights when the white or black balance is set improperly. In this case, carry out the automatic setting procedure for white and/or black balance.

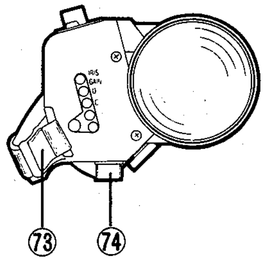
Battery Warning Indicator (Amber)
When this indicator blinks, the battery should be replaced. The battery will only supply sufficient power to the camera for a few minutes after the indicator starts blinking.

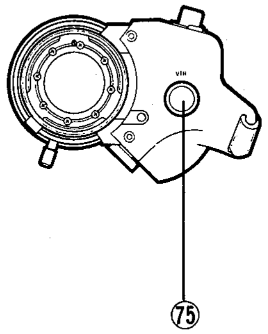
Shutter/High Gain Indicator (Green/Red)
The indicator lights red to indicate high gain selection of +9 dB or +18 dB with the High Gain Selection switch ㉔.
Note: If the portable VTR is not connected to the camera, the Recording/Tally indicator will not light.

12X Servo Control Zoom Lens J12X10BKRSM









61. Auto Iris Button

When this button is pressed while the Iris Control Selection switch (62) is set to the M (manual) position, the lens iris is automatically set according to the light intensity reaching the lens.

Note: Button must be pressed for 5 seconds or improper iris setting will result.

62. Iris Control Selection Switch (A/M)

This switch selects the operational condition of the lens iris.

A (Auto): The lens iris is automatically controlled. When the camera is used in studio applications together with the Remote Control Unit (RCU), the switch should be set to this position. In this case, the lens iris is remotely controlled from the RCU.

M (Manual): The lens iris can be manually controlled by rotating the Iris ring (66). With this setting, correct lens iris can be instantly set by pressing the Auto Iris button (61).

63. Servo Zoom Control (Wide/Tele)

The zoom function of this high quality 12:1 zoom lens can be controlled by pressing this control. Zooming to tele as well as wide angle is possible. Furthermore, the zooming speed can be controlled by changing the pressure applied on this control.

64. Return Video Button

When an auxiliary signal such as a lineview signal from a Special Effects Generator is supplied to the auxiliary connector of the Remote Control Unit (RCU) while the camera is set up for system operation, the signal can be previewed on the electronic viewfinder as long as this button is kept pressed.

When the 3/4" U-vision portable recorder, connected through the 14-pin camera input connector, or an S-VHS VTR recorder is set to the playback mode, the played back picture can be viewed as long as this button is kept pressed.

65. Lens Cable with 12-pin Connector

This cable supplies power to the servo control zoom motor and the automatic iris control device.

The cable should be connected to the Lens Connector ② on the camera.

66. Iris Ring

When the Iris Control Selection switch (62) is set to the M (manual) position, the lens iris can be manually adjusted by rotating this ring.

67. Focus Ring

Rotating this ring will change the lens focus.
By observing the picture in the viewfinder, correct focus can easily be set.
With the optional Lens Control Kit (WV-LK35), including flexible cable for the Zoom Remote Controller and Focus Controller, zooming and focusing can be remotely controlled.

68. Macro Button

For close-up shooting, rotate the Zoom Ring/Lever (69) to the macro area while pressing this button. After setting the Servo/Manual Zoom Selection switch (70) to the MANU (manual) position, close-up shooting up to approximately 10 mm (3/8") from the lens surface is possible by rotating the Zoom Ring/Lever.

69. Zoom Ring/Lever

By setting the Servo/Manual Zoom Selection switch (70) to the MANU (manual) position, zooming can be manually performed through use of this ring/lever. 12 times magnification is possible from wide angle to telephoto. When the Servo/Manual Zoom Selection switch (70) is set to the SERVO position, zooming is performed with the Servo Zoom control (63).

70. Servo/Manual Zoom Selection Switch (SERVO/MANU)

This switch is used to select between zooming by servo control or manually.

SERVO: Zoom operation is performed by pressing either side of the Servo Zoom control (63).

MANU: Zoom operation is performed manually by rotating the Zoom Ring/Lever(69).

71. Flange-back Lock Knob

The Flange-back Adjustment Ring (72) can be locked by turning this knob.

72. Flange-back Adjustment Ring

The flange-back of the lens can be adjusted by rotating this ring. The Flange-back Lock knob (71) should be released prior to adjustment.

73. Hand Strap

The hand strap helps the camera operator in getting a firm grip on the camera. The hand strap length can be freely adjusted.

74. Connector for Zoom Remote Controller

The Zoom Remote Controller, included in the Lens Control Kit WV-LK35, should be connected to this connector. This will allow remote control of zooming.

75. VTR Start/Stop Button (VTR)

This switch is used to start and pause the connected recorder. The function of the button is identical to the VTR Start/Stop Button ⑤ on the camera.
After having set the recorder to the recording standby mode, press this button to start and pause recording. While recording is in progress, the Recording/Tally indicator in the viewfinder and the Tally light (51) on front of the viewfinder lights.

Note: If a zoom lens with an 8-pin connector is used, the lens connector conversion cable WV-LC10 must also be used. In this case, if recording is started by pressing the VTR Start/Stop button on the lens, the recording cannot be paused by pressing the VTR Start/Stop button ⑤ in the camera. To pause recording, the VTR Start/Stop button on the lens must be pressed again.

CIRCUIT DESCRIPTION FOR WV-F200

1. Outline

Incoming light which contains red (R) , green (G) and blue (B) light enters a prism through a zoom lens and separated into the R, G and B light go to the respective CCD image sensors and converted into the video signal whose level corresponds to the incoming light intensity. In this time, the CCD drive board receives clock pulse (Approx. 28MHz) , horizontal drive pulse and field (FLD) pulse from the sync board and generates the pulses for driving the CCD image sensor. The video signals from the CCD image sensors are then sent to the amplifier circuit and eliminates the noises (reset noise, amplifier noise and shoot noise) from the video signals by using the correlative double sampling circuit. The corrected video signals are then amplified to the necessary level.

The corrected/amplified R, G and B signals are supplied to the dark shading correction circuit in the process-1 board where their dark shading is corrected and the gain of R, G and B signal is controlled by setting the High Gain Selection Switch. The dark shading correction signal is generated in the shading board.

The black level variation of R, G and B signal due to the flare is also compensated by the flare compensation circuit and then sent to the pedestal control circuit, where the pedestal of R and B signal is controlled automatically by the DC voltages from the auto board to match them with those of G signal. In this way, the white balance is set automatically.

Those signals are then sent to the AIC NAM video mix circuit, and the highest signal among the mix signal is detected and used to control the lens iris corresponding to the incoming light intensity in the shading board.

The R, G and B signals from the Process-1 board are fed to the signal processing circuit in the Process-2 board.

These signals are then sent to the gamma correction section to correct non-linear photoelectric conversion characteristic of cathode ray tube (CRT) and to produce a linear picture of high fidelity. Those signals are then sent to the matrix circuit and are mixed to reproduce better color quality. The G signal from the signal processing circuit in the Process-2 board is fed to the vertical (V) aperture generator and the horizontal (H) aperture signal generator in the Detail board. The H and V aperture signal thus generated are mixed together, fed through the detail output circuit to R, G and B signal processing circuit in the Process-2 board, and added to the R, G and B signal to enhance the horizontal and vertical resolution.

The R, G and B signal are then supplied to the camera/bar select circuit in the Encoder board. The R, G and B color bar signal are also sent to the select circuit from the color bar circuit. These signal is selected by setting the color bar/camera selection switch and sent to the V, U and luminance (Y) matrix circuit respectively. The V and U signals are then sent to the balance modulator circuit to generate the chrominance signal.

The chrominance signal is sent to the video output circuit where it is mixed with the Y signal to make a video signal. The video signal is sent to other system product through the camera adaptor. The R, G and B signal are sent to the auto white control circuit, auto blanking offset comparison circuit and auto black control circuit respectively. In the auto white control circuit, the R and B signal levels are compared with the reference G signal and the difference in comparison is sent to the microprocessor. The microprocessor sends the DC voltages through the auto control output circuit to the R and B dark shading correction/gain control circuit to control the gain of the R and B signal to match them with the G signal level. In this way, the white balance is automatically set.

Similarly, the dark level of R and B signal are compared with that of G signal in the auto black control circuit.

The resultant in comparison is fed to microprocessor.

The microprocessor sends the DC voltages through the auto control circuit to the R and B signal processing circuit in order to match the black level of R and B signal with that of G signal automatically.

In the auto blanking offset (Pulse Cancel) compensation circuit, the dark level of G, R and B signal at + 18dB position of the High Gain Selection Switch are compared with that in the 0 dB position. The difference in comparison is fed to the microprocessor. The microprocessor sends the DC voltages through the auto control output circuit to the G, R and B dark shading correction/gain control circuit in order to match the black level of G, R and B signal at + 18dB position of the High Gain Selection Switch that in the 0 dB position.

When the auto white and auto black, setting fails, the microprocessor sends the warning signal to the viewfinder through the auto warning output circuit to blink the auto warning indicator.

The 28MHz frequency oscillated by the internal 28MHz oscillator circuit is fed to the sync generator IC which generates the necessary signals/pulses.
The gen-lock sync separation circuit receives the black burst signal or composite video signal supplied to the gen-lock input connector on the rear of camera or on the remote control unit (RCU) , and separates the burst and sync signal from the gen-lock signal. The separated sync and burst signals are fed to the sync generator IC18 and 28MHz (8fsc) OSC circuit respectively.
The subcarrier (SC) signal circuit receives the subcarrier (sc) signal from the sync generator IC and sends it to the other circuit. This circuit also generates 1/4 subcarrier (approx. 900 kHz) signal for zebra indicator and sends it to the other circuit.
The DC voltages which are supplied to all circuit board are generated in the power board, and +9.2V, +5.1V, +20.9V, −8V and −4.8V DC voltages are sent to the necessary circuits.
The camera adaptor receives all neccesary signal for VTR and RCU, and sends them to VTR and RCU through 32-pin VTR/RCU connector.
The microprocessor circuit receives the information from the remote control unit as a serial data (digital signal) and converts it into analog signals and are then sent to camera head as control signals. The audio amplifier circuit amplifies audio signal picked up by the microphone. The amplified audio signal is fed to the VTR for recording and audio monitor jack. The signal output circuit receives R, G, B, Chrominance (C) and Luminance (Y) signal from the camera head and sends them to the RCU through VTR/RCU Connector CN3. The RCU power control and RCU/Camera select circuit receives the serial data signal from RCU, and generates +9V DC RCU mode signal when the serial data is supplied and is supplied to all circuits on the main board. The playback control circuit sends the video signal to the VTR for recording through 32-pin VTR/RCU connector and send the playback video signal to the viewfinder when the VTR is set to the playback mode. The recording trigger circuit receives the recording trigger pulse from the Shading board through the Mother board and generates the recording Start / Stop pulse for VTR connected to the camera.

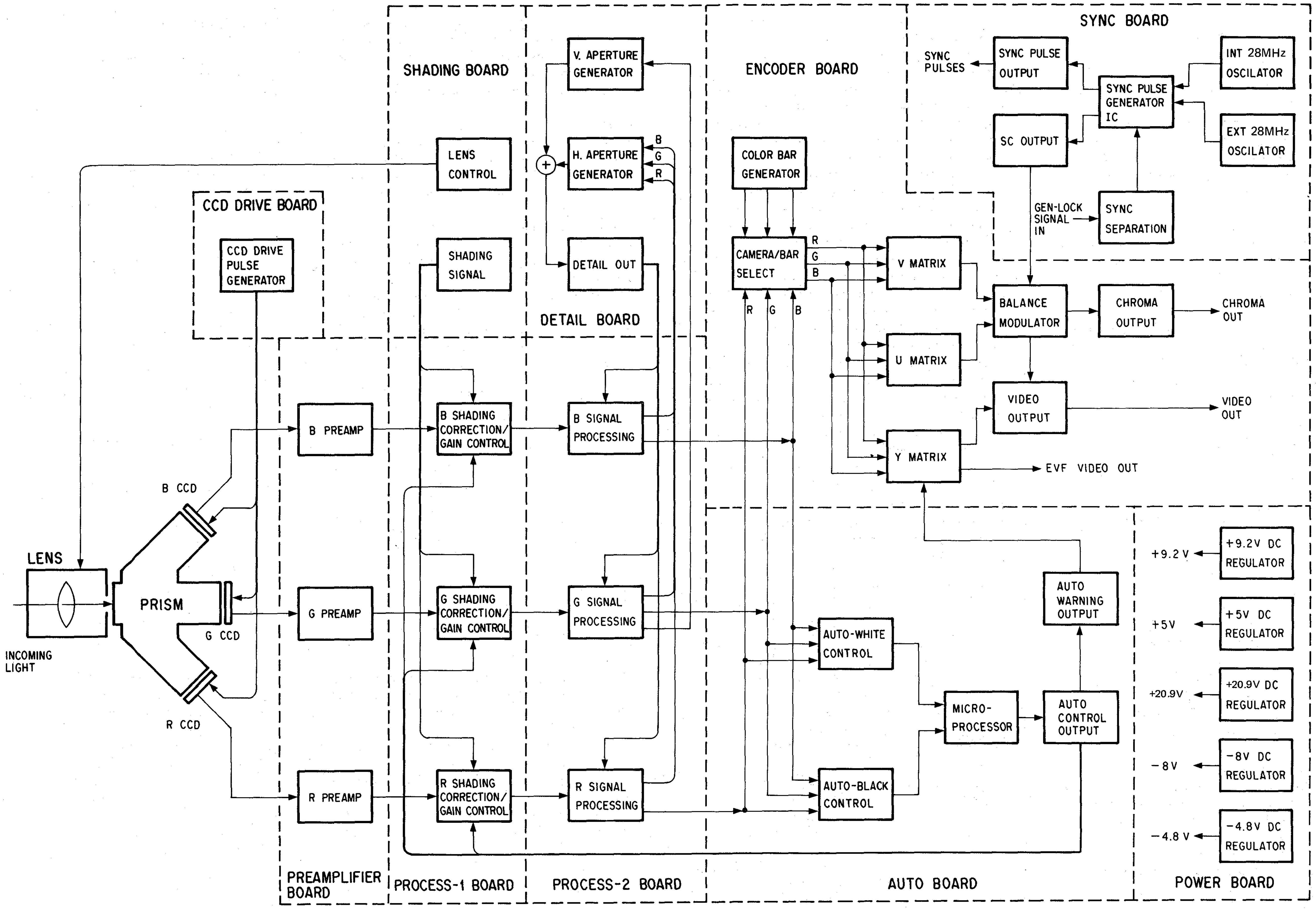

SHADING BOARD
DETAIL BOARD
ENCODER BOARD
SYNC BOARD
CCD DRIVE BOARD
PREAMPLIFIER BOARD
PROCESS-1 BOARD
PROCESS-2 BOARD
AUTO BOARD
POWER BOARD
LENS CONTROL
SHADING SIGNAL
CCD DRIVE PULSE GENERATOR
V. APERTURE GENERATOR
H. APERTURE GENERATOR
DETAIL OUT
+
B
G
R
COLOR BAR GENERATOR
CAMERA/BAR SELECT
R
G
B
R
G
B
SYNC PULSES
SYNC PULSE OUTPUT
SYNC PULSE GENERATOR IC
INT 28MHz OSCILATOR
EXT 28MHz OSCILATOR
SC OUTPUT
GEN-LOCK SIGNAL IN
SYNC SEPARATION
V MATRIX
U MATRIX
Y MATRIX
BALANCE MODULATOR
CHROMA OUTPUT
CHROMA OUT
VIDEO OUTPUT
VIDEO OUT
EVF VIDEO OUT
LENS
INCOMING LIGHT
PRISM
B CCD
G CCD
R CCD
B PREAMP
G PREAMP
R PREAMP
B SHADING CORRECTION/ GAIN CONTROL
G SHADING CORRECTION/ GAIN CONTROL
R SHADING CORRECTION/ GAIN CONTROL
B SIGNAL PROCESSING
G SIGNAL PROCESSING
R SIGNAL PROCESSING
AUTO-WHITE CONTROL
AUTO-BLACK CONTROL
MICRO-PROCESSOR
AUTO CONTROL OUTPUT
AUTO WARNING OUTPUT
+9.2 V
+9.2V DC REGULATOR
+5V
+5V DC REGULATOR
+20.9V
+20.9V DC REGULATOR
−8 V
−8V DC REGULATOR
−4.8 V
−4.8V DC REGULATOR

Fig. 1-1 Outline of WV-F200

2. CCD & Prism Assembly

2-1 CCD & Prism Assembly

The incoming light which contains the red (R), green (G) and blue (B) information enters the optical system through a zoom lens and a color temperature conversion filter.
The optics system using a dichroic prism separates the incoming light into three primary color lights, red, green and blue. The separated light enters corresponding CCD image sensor respectively to convert it into the video signal.

- **Color Temperature Conversion Filter**

Generally, the human eye is sensitive to electromagnetic waves from 380 mμ (mμ = nm) to 780 mμ in wavelength (the visible region). In addition, the eye also discerns the wavelength difference as a color difference, seeing light between 400 mμ to 500mμ wavelength as predominantly blue information, the light between 500mμ to 600 mμ as green information, and the light between 600 mμ to 700 mμ as red information. The entire light in the visible range of wavelength from 380 mμ to 780 mμ is seen as different amount of white light.

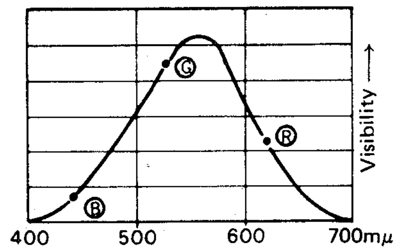


Fig. 2-1 **Standard Luminosity Curve**

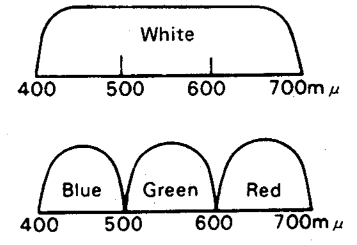


Fig. 2-2 **The Visible Spectrum**

When a carbon is burned, it emits light of a different quality depending on how hot it is. Various natural light can be expressed in terms of a color temperature which may be referred to a light emitted from the burning carbon used as a standard. A light source of 3200°K (K = Kelvin: -273°C corresponds to 0°K an absolute temperature) color temperature, which is used in studios, implies that its quality (color) is the same as that emitted from the carbon burning at 3200°K (2927°C).

The relationship between the color temperature of light sources used for illumination and weather conditions are shown in Fig.2-3. The color temperature goes up as the weather turns rainy from clear. This may be related to the burning carbon (charcoal) as follows. When the charcoal is heated and begins to glow (at low temperature), it emits a reddish light. But when it is so-called white hot (at high temperature), a bluish light is emitted. In other words, the light at a low color temperature is considered reddish and at high color temperature is considered bluish.
When a color camera is pointed at an object illuminated by a light of low color temperature, it reproduces a reddish picture. When the color camera is pointed at an object illuminated by a light of high color temperature, it produces a bluish picture. This camera is designed to be used under the light whose color temperature is 3200°K, and it has the 4-position color temperature conversion filter wheel which converts the color temperature of incoming light to 3200°K. When the filter wheel is set to the position 1, the transparent filter is inserted into the light path. When it is set to the position 2, the 5600°K color temperature conversion filter is inserted into the light path and the 5600°K light is converted to the 3200°K light. When it is set to position 3, the 5600°K color temperature conversion filter with 1/8 neutral density (ND) filter is inserted into the light path and the 5600°K light is converted to the 3200°K light. The position 3 is used for fine day outdoor. The position 4 is for closing the lens. In addition to the color temperature conversion filter wheel, this camera is so designed that the level of red and blue signals can be set automatically to match the color temperature of the light source which illuminates the object in order to ensure proper color reproduction.

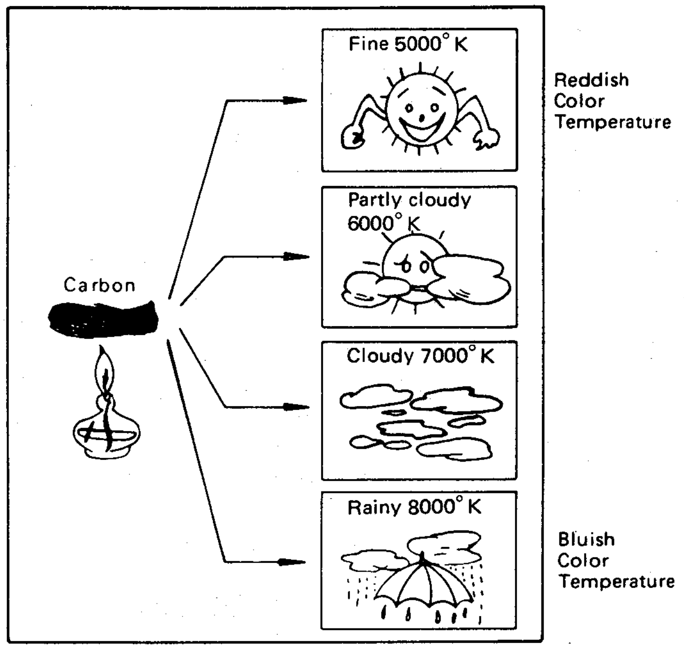


Fig. 2-3 **Color Temperature and Wheather Condition**

The blue (B) light is reflected at the boundary face between the 1st and 2nd prism and the surface of 1st prism, and enters to the B CCD image sensor through the trimming filter and infrared (IR) cut filter. The red (R) and green (G) lights pass through the boundary between 1st and 2nd prism.

- **Trimming Filter**

The boundary face between the 1st and 2nd prism also reflects a little red and green light, not only blue light. The trimming filter passes only the blue light and prevents the red and green light going to the blue CCD image sensor.

- **Infrared (IR) Cut Filter**

As shown in Fig. 2-4, the CCD image sensor has some sensitivity in the infrared region beyond the visible range. The infrared (IR) cut filter cuts off the infrared light rays which the human eye does not see as light. If the color signal is made by using the video signal corresponding to the infrared rays which the human eye can not normally see, the colors of pictures on the monitor and that seen with the naked eye would differ substantially.

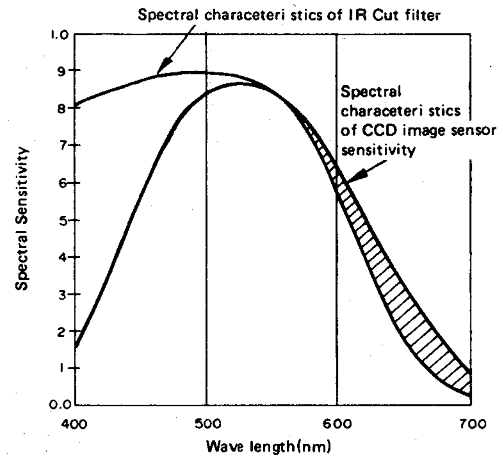


Fig. 2-4 **IR Cut Filter Response**

The red (R) and green (G) lights reach on the boundary between the 2nd and 3rd prism and only the R light reflects. The reflected R light is again reflected by the boundary between the 1st and 2nd prism, and enters the R CCD image sensor through the trimming filter and the IR cut filter as in the case of the B light.
The remaining green (G) light which passes through the boundary between the 2nd and 3rd prism goes to the G CCD image sensor through the trimming filter and the IR cut filter as in the case of the B and R lights.

2-2 CCD Image Sensor

The CCD & Prism Assembly receives CCD drive pulses and feeds them to the R, G and B CCD image sensors.
The R, G and B prevideo signal is sent from the CCD & Prism Assembly to pin 2 of CN2, CN3 and CN4 on the preamplifier board respectively.

- **CCD Image Sensor**

The CCD image sensor ICX021-L36 has 291000 picture elements (vertical (V) 582 × horizontal (H) 500) , and Image Cell Structure and Optical Black are as follows.

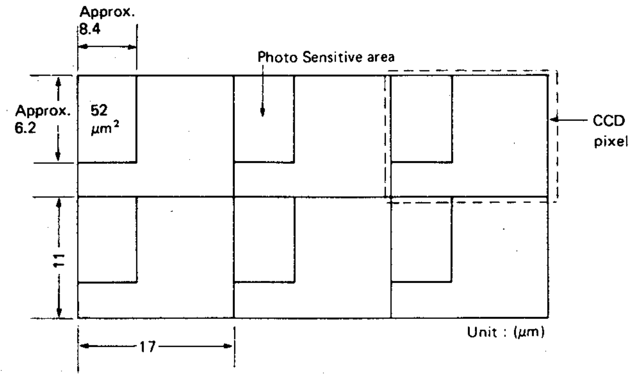


Fig. 2-5 **Image Cell Structure**

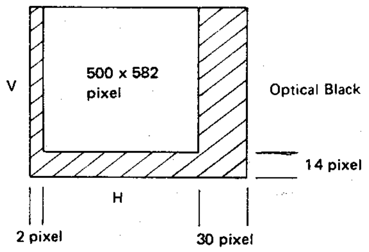


Fig. 2-6 **Optical Black**

Structure	Interline transfer CCD (With MOS sensor)		
Unit cell size	17μm (H) × 11μm (V)		
Dummy cell	8 bit for Horizontal, 1 bit for Vertical (Even field only)		
Chip size	10.0mm (H) × 9.3mm (V)		
Optical Black	Horizontal :	Front portion	2 pixel
		Back Portion	30 pixel
	Vertical :	Front portion	14 pixel

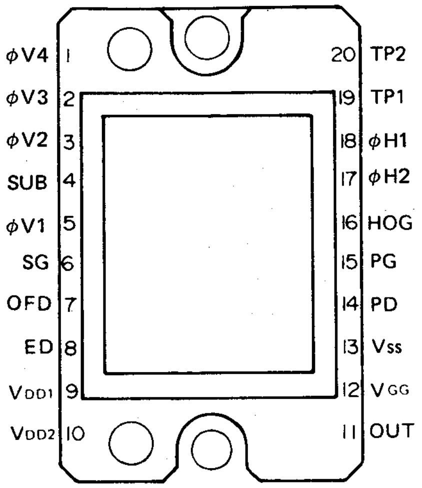

φV4 1
φV3 2
φV2 3
SUB 4
φV1 5
SG 6
OFD 7
ED 8
VDD1 9
VDD2 10
20 TP2
19 TP1
18 φH1
17 φH2
16 HOG
15 PG
14 PD
13 Vss
12 VGG
11 OUT

Fig. 2-7 Appearance of CCD Image Sensor

The pin identification of CCD image sensor ICX 021-L36 is as follows;

Pin No.	Pin Name	Descreption
1	øV4	Vertical Transfer Pulse-4
2	øV3	Vertical Transfer Pulse-3
3	øV2	Vertical Transfer Pulse-2
4	SUB	Ground
5	øV1	Vertical Transfer Pulse-1
6	SG	Sensor gate bias in
7	OFD	Anti-blooming bias in
8	ED	Edge drain bias in
9	VDD1	Power source-1
10	VDD2	Power source-2
11	OUT	Prevideo out
12	VGG	Output amplifier gate bias in
13	VSS	Output amplifier gate bias in
14	PD	Precharge drain bias in
15	PG	Precharge clock pulse in
16	HOG	Horizontal register read-out Control bias in
17	øH2	Horizontal Transfer Pulse-2
18	øH1	Horizontal Transfer Pulse-1
19	TP1	Test pin-1
20	TP2	Test pin-2

- **Interline transfer CCD**

As shown in the Fig 2-8, the interline transfer CCD consists of photo diodes, vertical shift registers and a Horizontal shift register.

When the CCD receives the incoming light, each MOS sensor generates the electronic charge in proportion to the light intensity.

When the sampling pulse is supplied, the electronic charge is transferred to the vertical shift registers.

Then each charge generated by each MOS sensor is transferred to the Horizontal shift register in regular sequence.

The electronic charge at the Horizontal shift register is read out by Horizontal scanning timing.

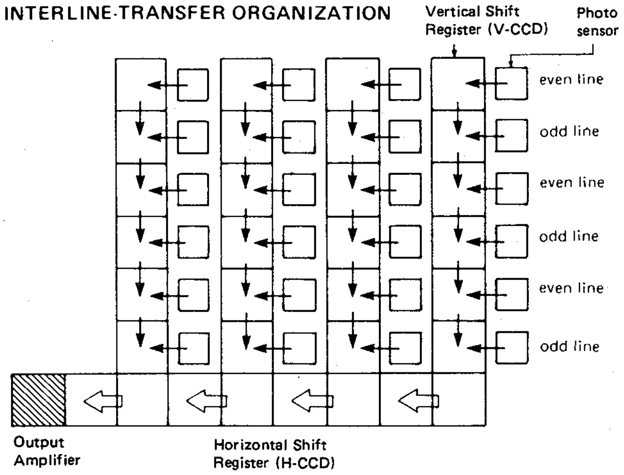

INTERLINE-TRANSFER ORGANIZATION
Vertical Shift Register (V-CCD)
Photo sensor
even line
odd line
even line
odd line
even line
odd line
Output Amplifier
Horizontal Shift Register (H-CCD)

Fig. 2-8 Interline-Transfer Organization

3. Preamplifier Board

3-1 R Signal Amplifier Circuit
  - **3-1-1 R Signal Detect Circuit**
  - **3-1-2 R White Clip Circuit**
  - **3-1-3 R Output Amplifier Circuit**

3-2 G Signal Amplifier Circuit
  - **3-2-1 G Signal Detect Circuit**
  - **3-2-2 G White Clip Circuit**
  - **3-2-3 G Output Amplifier Circuit**

3-3 B Signal Amplifier Circuit
  - **3-3-1 B Signal Detect Circuit**
  - **3-3-2 B White Clip Circuit**
  - **3-3-3 B Output Amplifier Circuit**

3-4 DC Voltage Regulator Circuit

3-1 R Signal Detect Circuit

3-1-1 R Signal Detect Circuit

This circuit receives the modulated R prevideo signal from the CCD & Prism assembly and eliminates reset pulses and noise, compensates spots/blemishes and generates R video signal.

The modulated R prevideo signal obtained at CCD & Prism assembly is supplied through buffer Q7 to pin 2 of sample hold IC3.

This signal is clamped inside IC3 by precharge sample hold pulse (SHP) which is supplied to pin 4. The clamped signal is then sent to the sample hold circuit inside IC3 where the signal components are sampled by the data sample hold pulse (SHD) sent through pin 6 of IC3. The sampled/detected signal is sent to the spot (blemish) compensation (correction) circuit in IC3, where the spot (blemish) is compensated by the R signal compensation signal ((R) SHP) sent through pin 19 of IC3.

The compensated signal is detected by sampling it again at sample hold circuit inside IC3 which receives the data sample hold pulse (SHD) from pin 6 of IC3 and the detected signal is held as sample signal.

The detected signal which is made by double sampling with SHD is fed to a differential amplifier to eliminate the noise component.

The R signel thus generated is then fed through pin 12 of IC3 to the white clip circuit.

3-1-2 R White Clip Circuit

The detected/corrected R signal obtained at pin 12 of IC3 is fed through buffer Q32 to white clip Q35/Q8 where the high level of R signal is clipped by DC voltage set by VR4 (R WHITE CLIP).

The R signal is then fed through amplifier Q9/Q10 and buffer Q11 to pin 3 of IC4. The delayed horizontal transfer pulse-2 (DL øH2) obtained at pin 1 of CN6 is sent to pin 9 of IC4, and R signal is supplied to the R output amplifier circuit every 1 horizontal period during low (L) level of DL øH2 pulse.

3-1-3 R Output Amplifier Circuit

The gated R signal obtained at pin 4 of IC4 is fed to 9.54 MHz low pass filter which removes the clock pulse component from the R signal.

The R signal is then fed to the amplifier circuit consisting of Q13~Q15 and it is sent through pin 4 of BI3 and Mother board to the Process-1 board.

3-2 G Signal Amplifier Circuit

3-2-1 G Signal Detect Circuit

This circuit receives the modulated G prevideo signal from the CCD & Prism assembly and eliminates reset pulses and noise, compensates spots/blemishes and generates G video signal.

The modulated G prevideo signal obtained at CCD & Prism assembly is supplied through buffer Q16 to pin 2 of sample hold IC5.

This signal is clamped inside IC5 by precharge sample hold pulse (SHP) which is supplied to pin 4. The clamped signal is then sent to the sample hold circuit inside IC5 where the signal components are sampled by the data sample hold pulse (SHD) sent through pin 6 of IC5.

The sampled/detected signal is sent to the spot (blemish) compensation (correction) circuit in IC5, where the the spot (blemish) is compensated by the G signal compensation signal ((G) SHP) sent through pin 19 of IC5.

The compensated signal is detected by sampling it again at sample hold circuit inside IC5 which receives the data sample hold pulse (SHD) from pin 6 of IC5 and the detected signal is held as sample signal.

The detected signal which is made by double sampling with SHD is fed to a differenctial amplifier to eliminate the noise component.

The G signal thus generated is then fed through pin 12 of IC5 to the white clip circuit.

3-2-2 G White Clip Circuit

The detected/corrected G signal obtained at pin 12 of IC5 is fed through buffer Q33 to white clip Q36/Q17 where the high level of G signal is clipped by DC voltage set by VR5 (G WHITE CLIP).

The G signal is then fed through amplifier Q18/Q19 and buffer Q20 to pin 2 of IC4. The delayed horizontal transfer pulse-2 (DL øH2) obtained at pin 1 of CN6 is sent to pin 10 of IC4, and G signal is supplied to the G output amplifier circuit every 1 horizontal period during low (L) level of DL øH2 pulse.

3-2-3 G Output Amplifier Circuit

The gated G signal obtained at pin 15 of IC4 is fed to 9.54MHz low pass filter which removes the clock pulse component from the G signal.
The G signal is then fed to the amplifier circuit consisting of Q21~Q23 and it is sent through pin 6 of BI3 and Mother board to the Process-1 board.

3-3 B Signal Amplifier Circuit

3-3-1 B Signal Detect Circuit

This circuit receives the modulated B prevideo signal from the CCD & Prism assembly and eliminates reset pulses and noise compensates spots/blemishes and generates B video signal.
The modulated B prevideo signal obtained at CCD & Prism assembly is supplied through buffer Q24 to pin 2 of sample hold IC6.
This signal is clamped inside IC6 by precharge sample hold pulse (SHP) which is supplied to pin 4. The clamped signal is then sent to the sample hold circuit inside IC6 where the signal components are sampled by the data sample hold pulse (SHD) sent through pin 6 of IC6.
The sampled/detected signal is sent to the spot (blemish) compensation (correction) circuit in IC6,where the spot (blemish) is compensated by the B signal compensation signal ((B) SHP) sent through pin 19 of IC6.
The compensated signal is detected by sampling it again at sample hold circuit inside IC6 which receives the data sample hold pulse (SHD) from pin 6 of IC6 and the detected signal is held as sample signal.
The detected signal which is made by double sampling with SHD is fed to a differential amplifier to eliminate the noise component.
The B signal thus generated is then fed through pin 12 of IC6 to the white clip circuit.

3-3-2 B White Chip Circuit

The detected/corrected B signal obtained at pin 12 of IC6 is fed through buffer Q34 to white clip Q37/Q25 where the high level of B signal is clipped by DC voltage set by VR6 (B WHITE CLIP).
The B signal is then fed through amplifier Q26/Q27 and buffer Q28 to pin 13 of IC4. The delayed horizontal transfer pulse-2 (DL øH2) obtained at pin 1 of CN6 is sent to pin 11 of IC4, and B signal is supplied to the B output amplifier circuit every 1 horizontal period during high (H) level of DL øH2 pulse.

3-3-3 B Output Amplifier Circuit

The gated B signal obtained at pin 14 of IC4 is fed to 9.54MHz low pass filter which removes the clock pulse component from the B signal.
The B signal is then fed to the amplifier circuit consisting of Q29~Q31 and it is sent through pin 2 of BI3 and Mother board to the Process-1 board.

3-4 DC Voltage Regulator

o **+20V Regulator Circuit**
The +20V DC voltage is produced by IC1 (b) and Q2, and obtained at the collector of Q2.
The output voltage is fed back to pin 5 of IC1 (b) by dividing the +20V DC voltage using R10 and R11 for stabilizing the +20V DC output voltage. Also, +10.4V generated by dividing +20.9V DC voltage using R12 and R13 is supplied to pin 6 of IC1 (b) for the reference voltage.

o **+4.9V Regulator Circuit**
The +4.9V DC voltage is produced by IC 1 (c) and Q4, and obtained at the collector of Q4.
The output voltage is fed back to pin 10 of IC1 (c) by dividing the +4.9V DC voltage using R22 and R23 for stabilizing the +4.9V DC voltage. Also, +2.5V generated by dividing +5.1V DC voltage using R24 and R25 is supplied to pin 9 of IC1 (c) for the reference voltage.

o **+ 8.8V Regulator Circuit**
The +8.8V DC voltage is produced by IC 1 (d) and Q5, and obtained at the collector of Q5.
The output voltage is fed back to pin 12 of IC1 (d) by dividing the +8.8V DC voltage using R28 and R29 for stabilizing the + 8.8V DC voltage. Also, + 4.6V generated by dividing +9.2V DC voltage using R30 and R31 is supplied to pin 13 of IC1 (d) for the reference voltage.

o **– 4.4V Regulator Circuit**
The –4.4V DC voltage is produced by IC 1 (a) and Q6, and obtained at the collector of Q6.
The output voltage is fed back to pin 3 of IC1 (a) by dividing the –4.8V DC voltage using R37 and R36 for stabilizing the –4.4V DC voltage. Also, –2.4V generated by dividing –4.8V DC voltage using R35 and R34 is supplied to pin 2 of IC1 (a) for the reference voltage.

4. CCD Drive Board

4-1 CCD Drive Pulse Generator Circuit
4-2 CCD Vertical Driver Circuit
4-3 CCD Bias Circuit

4-1 CCD Drive Pulse Generator Circuit

This circuit receives clock pulse (Approx 28MHz) , horizontal drive (HD)pulse and field (FLD) pulse from sync board and generates pulses for driving CCD image sensors.

The clock (CLK) pulse, FLD pulse and HD pulse are fed to pins 33, 34 and 35 of IC5 respectively and the following pulses are generated from IC5.

IC5 CX23047B Pin Identification

Pin No.	Name	In/Out	Description
1	SP1	Out	Sample Hold Pulse-1
2	SHD	Out	Data Sample Hold Pulse
3	SHP	Out	Precharge Sample Hold Pulse
4	XV4	Out	V. Transfer Pulse-4
5	XV2	Out	V. Transfer Pulse-2
6	Vss	–	Ground
7	GND	–	Ground
8	XV3	Out	V. Transfer Pulse-3
9	XV1	Out	V. Transfer Pulse-1
10	XSG2	Out	Sensor Gate Pulse-2
11	XSG1	Out	Sensor Gate Pulse-1
12	SPG	Out	Precharge Pulse
13	XH2	Out	H. Transfer Pulse-2
14	XH1	Out	H. Transfer Pulse-1
15	A2	Out	Spot Correction Output-2
16	A1	Out	Spot Correction Output-1
17	A0	Out	Spot Correction Output-0
18	A3	Out	Spot Correction Output-3
19	VDD	–	+4.9V DC Power
20	A4	Out	Spot Correction Output-4
21	A5	Out	Spot Correction Output-5
22	A6	Out	Spot Correction Output-6
23	GND	–	Ground
24	D4	In	Spot Correction Input-4
25	D3	In	Spot Correction Input-3
26	D2	In	Spot Correction Input-2
27	D1	In	Spot Correction Input-1
28	XVCT	Out	
29	TEST	–	Ground
30	CP	In	Clamp Pulse
31	Vss	–	Ground
32	XCK	Out	Clock Pulse (Negative)
33	CK	In	Clock Pulse (Approx 28MHz)
34	FLD	In	Field Pulse
35	HD	In	H. Drive Pulse
36	CL	In	Not Used
37	VAA	Out	Power Save Control
38	H.BLK	Out	H. Blanking Pulse
39	ID	-	Not Used
40	CLP3	Out	Not Used
41	CLP2	Out	Not Used
42	CLP1	Out	Clamp Pulse-1
43	VDD	In	+4.9V DC Power
44	XDL2	Out	Not Used
45	XDL1	Out	Not Used
46	SH2	Out	Not Used
47	SH1	Out	Not Used
48	SP2	Out	Sample Hold Pulse-2

These pulses are sent to the CCD & Prism assembly and other circuits.

IC10 is a ROM (Read Only Memory) IC used for the compensation of spots/blemishes on the CCD image sensor. The position of spots/blemishes is memorized in IC10 and this information is sent to IC5. The data sample hold and precharge sample hold pulses which coincide with the position of spot/blemishes are not generated. Therefore, the spots/blemishes are skipped from the sampling, ie, the spots/blemishes are not detected and not displayed.

Q5 controls DC power for ROM IC10.

Note : CCD spot correction IC10 is not installed on the CCD drive board when the CCD image sensor has no spots/blemishes.

The precharge sample hold pulse (SHP) obtained at pin 3 of IC5 is sent through buffer IC11 (e) and pin 4 of BI2 to the Preamplifier board.

The data sample hold pulse obtained at pin 2 of IC 5 is sent through pulse delay circuit IC11 (c) , (b) and (d) , buffer Q6 and pin 6 of BI2 to the Preamplifier board as G signal sample hold pulse.

The sample hold pulse-1 obtained at pin1 of IC5 is sent through pulse delay circuit IC12 (c), (b) and (a) , buffer Q7 and pin 10 of BI2 to the Preamplifier board as R signal sample hold pulse.

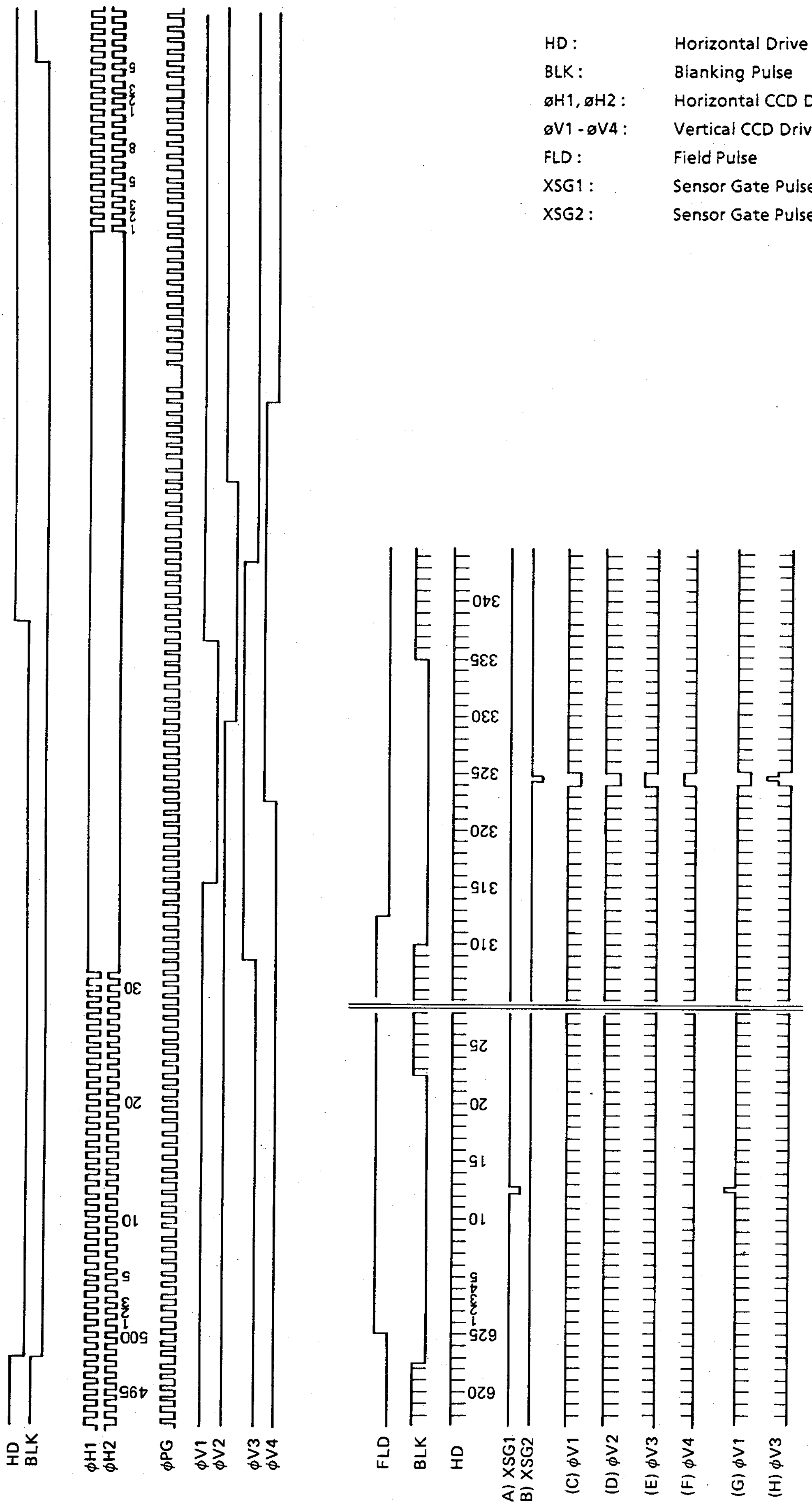
The sample hold pulse-2 obtained at pin 48 of IC5 is sent through pulse delay circuit IC12 (d), (e) and (f) , buffer Q8 and pin 8 of BI2 to the Preamplifier board as B signal sample hold pulse.

The horizontal transfer pulse-2 obtained at pin 13 of IC5 is sent through pulse delay circuit IC8 (e) , (c) and (a) and pin 12 of BI2 to the Preamplifier board as gate pulse for prevideo signal.

The rising and decay time of gate pulse is controlled by VR2 (DLøH2 WIDTH) and VR1 (DLøH2 PHASE) respectively.

The horizontal transfer pulse-2 is also sent through buffer IC8(d) , IC7(c) and(d) and pin 3 of CN2 to the CCD & Prism Assembly as horizontal transfer pulse-2 (øH2).

The horizontal transfer pulse-1 obtained at pin 14 of IC5 is sent through pulse delay circuit IC11 (a) and (f) and pin 2 of BI2 to the Preamplifier board as data sample hold pulse (SHD).


HD
BLK
φH1
φH2
φPG
φV1
φV2
φV3
φV4
495
500
1
2
3
5
10
20
30
8
FLD
BLK
HD
(A) XSG1
(B) XSG2
(C) φV1
(D) φV2
(E) φV3
(F) φV4
(G) φV1
(H) φV3
620
625
1
2
3
4
5
10
15
20
25
310
315
320
325
330
335
340

HD :	Horizontal Drive Pulse
BLK :	Blanking Pulse
øH1, øH2 :	Horizontal CCD Drive Pulse
øV1 - øV4 :	Vertical CCD Drive Pulse
FLD :	Field Pulse
XSG1 :	Sensor Gate Pulse for Odd field
XSG2 :	Sensor Gate Pulse for Even field

Fig. 4-1 CCD Drive Pulse Timing Chart

The horizontal transfer pulse-1 is also sent through buffer IC8 (f) , IC7 (e) and (f) and pin 1 of CN2 to the CCD & Prism Assembly as horizontal transfer pulse-1 (øH1).

4-2 CCD Vertical Driver Circuit

This circuit receives vertical transfer pulses from IC5, convert the their pulse level and send them to the CCD & Prism Assembly.

The vertical transfer pulse-1(XV1), 2(XV2), 3(XV3) and 4 (XV4) from pins 9, 5, 8 and 4 of IC5 are supplied to level converter in IC1 through pins 17, 19, 18 and 22 respectively.

The level converted vertical transfer pulse-1 (øV1), 2 (øV2), 3 (øV3) and 4 (øV4) obtained at respective pins 10, 6, 7, 3 of IC1 are supplied to the CCD & Prism Assembly.

The sensor gate pulse-1 (XSG1) and 2 (XSG2) from pins 11 and 10 of IC5 are supplied to pins 15 and 16 of IC1. In IC1, XSG1 and XSG2 are mixed and the mixed signal is converted its level and obtained at pin 11 of IC1.

This signal is supplied to pins 8 and 9 of IC1 for mixing them with the vertical transfer pulses 1 and 3 respectively.

Pin No.	Pin Name	In/Out	Description
1	GND1	-	Ground
2	NV	Out	Drive pulse
3	Vø4	Out	V transfer pulse-4
4	Vcc2-4	In	Middle bias
5	Vcc2-2	In	Middle bias
6	øV2	Out	V transfer pulse-2
7	øV3	Out	V transfer pulse-3
8	Vcc2-3	In	Middle bias
9	Vcc2-1	In	Middle bias
10	øV1	Out	V transfer pulse-1
11	SG	Out	Sensor gate pulse
12	GND2	-	Ground
13	Vcc3-1	In	Low bias
14	Vcc1	In	Power
15	XSG1	In	Sensor gate pulse-1
16	XSG2	In	Sensor gate pulse-2
17	XV1	In	V transfer pulse-1
18	XV3	In	V transfer pulse-3
19	XV2	In	V transfer pulse-2
20	H BLK	In	Horizontal blanking pulse
21	V_{AA}	In	Power save
22	XV4	In	V transfer pulse-4
23	XNV	In	V transfer pulse-4
24	V_{CC}3-2	In	Low bias

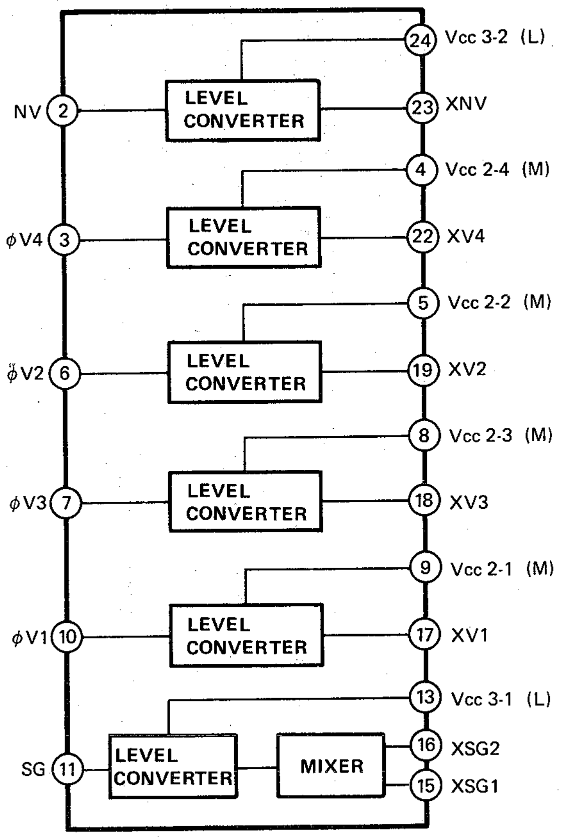


Fig. 4-2 Block Diagram of IC1

4-3 CCD Bias Circuit

This circuit generates the power source of CCD image sensor.

- The horizontal transfer pulse DC (+6V) is generated by Q4, and fed through pin 1 of CN1 to the CCD & Prism Assembly.
- The G precharge pulse DC (+8.2V) is generated by dividing +20V DC by R43 and R44, and fed through pin13 of CN1 to the CCD & Prism Assembly.
- The vertical register read-out control bias (+1.0V) is generated by dividing +20V DC by R39 and R40, and fed through pin 2 of CN1 to the CCD & Prism Assembly.
- Following DC bias are generated by dividing +20V DC by R34~R38, and fed to the CCD & Prism Assembly.
  - H Bias (+0.8V)
  - Output Amplifier Gate Bias (+9.2V)
  - B Anti-Blooming Bias (+15.0V)
  - Sensor Gate Bias (+11.1V)
- Following DC bias are generated by dividing +20V DC by R28~R33, and fed to the CCD & Prism Assembly.
  - G Anti-Blooming Bias (+15.0V)
  - Precharge Drain Bias (+17.8V)
  - R Anti-Blooming Bias (+15.0V)

5. Process-1 Board

5-1 G Signal Processing Circuit
  5-1-1 G Shading Correction Circuit
  5-1-2 G Signal Gain Control Circuit
  5-1-3 G Flare Compensation Circuit
5-2 R Signal Processing Circuit
  5-2-1 R Shading Correction Circuit
  5-2-2 R Signal Gain Control Circuit
  5-2-3 R Flare Compensation Circuit
5-3 B Signal Processing Circuit
  5-3-1 B Shading Correction Circuit
  5-3-2 B Signal Gain Control Circuit
  5-3-3 B Flare Compensation Circuit

5-1 G Signal Processing Circuit

5-1-1 G Shading Correction Circuit

The green (G) signal (A) is supplied from pin 7 of CN1 through buffer Q1, VR1 (G INPUT GAIN) and CT1 (G FREQ.) to emitter of amplifier Q2 where the G signal is amplified and undergoes (or receives) the shading correction.

The G dark shading correction sigual (B) from the shading board is sent through pin 9 of CN1 to pin 5 of analog switch IC1, and the G pulse cancel DC from the auto board is sent through pin 8 of CN1 to pin 3 of IC1.

The analog switch is controlled by the horizoned drive (HD) pulse (D) which is fed to the control terminal (pin 9) of IC1. During the negative portion of HD pulse, pins 5 and 4 of IC1 are connected and the dark shading correction signal is fed through buffer Q76 to the emitter of Q2 where it is mixed with the G signal (A) for correcting the dark shading.

During the positive portion of HD pulse, pins 3 and 4 of IC1 are connected and the G pulse cancel DC is fed through buffer Q76 to the emitter of Q2 in order to match the G pedestal level when the Auto White/Auto Black Set Switch in front of the camera is set to the ABC position, i.e, set the blanking level equal to active scan dark current. The G pulse cansel DC level is controlled by VR13 (G PULSE CANCEL) . The G signal (C) which undergoes the dark shading correction and the blanking offset (pulse cancel) control is sent to buffer Q3.

The G signal (E) at the emitter of Q3 is fed to OB clamp Q4 where the G signal is clamped by the clamp pulse (CP) (F) supplied to the base of Q4 from pin 30 of CN1 through clamp pulse generator circuit consisting of IC10(a)~IC10(d). The clamped G signal is then sent to pin 2 of analog switch IC1.

During the positive portion of preblanking signal, pins 1 and 15 of IC1 are connected and the noise during the blanking period is eliminated. The analog switch is controlled by the preblanking signal (PRE.BL) which is fed to pin 10 of IC1.

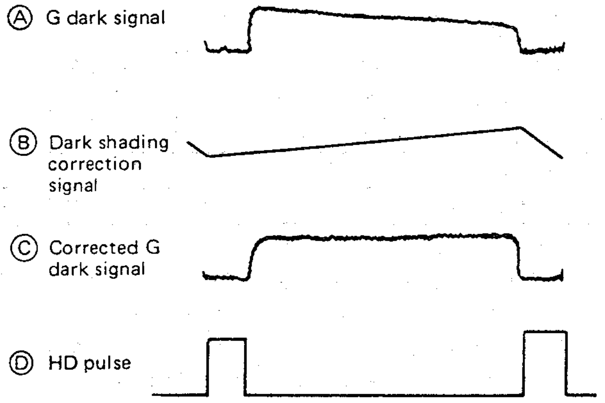


Fig. 5-1-1 Dark Shading Correction

The G signal obtained at pin 15 of IC1 is sent to the white clip Q5/Q6 where the high level of G signal is clipped by DC voltage determined by dividing with R14 and R15.

The clipped G signal (H) is then sent through buffer Q7 to the gain control circuit.

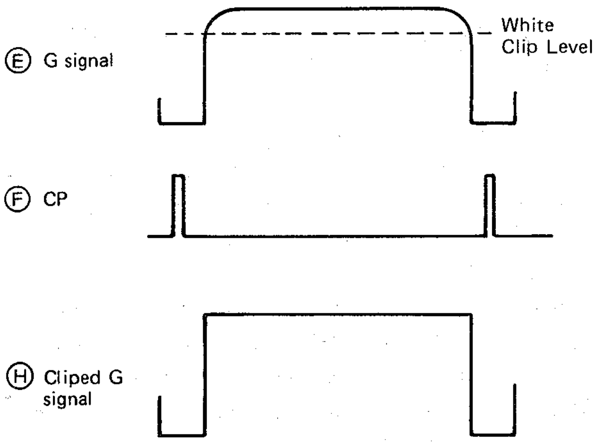


Fig. 5-1-2 White Clip

5-1-2 G signal Gain Control Circuit

The G sigual from the dark shading correction circuit is fed to the high gain control circuit consisting of IC3 and Q8~Q11. IC3 and Q8 control the gain and Q9~Q11 reduce the noise when the high gain selection switch is set to the +9dB or +18dB position.

When the high gain selection switch is selected to 0dB, +9dB or +18dB position, the DC potentials obtained at pins 23 and 21 of CN1 are supplied through Q80 and Q78 to the base of IQ9 and Q10 respectively therefore, due to high (H) level or low (L) level at pins 23 and 21 of CN1, gain control Q9 and Q10 works as shown in the table below.

Position of High Gain Selection Switch	Pin23 of CN1	Pin21 of CN1	Q80	Q79	Q9	Q10
0 dB	H	H	OFF	OFF	OFF	OFF
+9 dB	L	H	ON	OFF	ON	OFF
+18dB	H	L	ON	ON	ON	ON

As a result, the gain of Q8 becomes minimum in the 0dB position. In the +9dB position, the gain of Q8 becomes triple of that in the 0dB position. In the +18 dB position the gain of Q8 becomes eight times of that in the 0dB position.

Q9 and Q10 reduce the noise when the high gain selection switch is set to +9dB or +18dB position.

When the switch is set to +9dB position, Q9 is turned ON and C13 is connected to the emitter of Q8.

When the switch is set to +18dB position, Q9 and Q10 are turned ON and C13 and C14 are connected to the emitter of Q8.

In this way, the noise is reduced by limiting the frequency response of the amplifier.

The G signal whose gain is thus controlled is sent through pins 6 and 14 of IC3 and amplifier circuit consisting of Q12~Q15 to buffer Q16.

The G signal (A) obtained at the emitter of Q16 is fed to clamp circuit Q17 where the blanking level of G signal is clamped by the clamp pulse (CP) (B) supplied to the base of Q17 and the blanking level is set to the DC voltage at the emitter of Q17.

The G pedestal control signal is sent from pin 26 of CN1 to the emitter of Q17, and VR16 (G PEDESTAL) sets the pedestal level of the G signal by changing the clamped potential.

The G signal whose blanking potential is set is sent through buffers Q18 and Q19 to Q20 where the G signal is mixed with composite preblanking (C.PRE BL) signal (C) and the mixed G signal is sent to the black level clip circuit consisting of Q21~Q23 where the low level (C.PRE BL) portion of G signal is clipped.

As a result, the G signal (E) is made. The G signal is then sent through buffer Q24 and pin 20 of CN1 to the Process-2 board. On the other hand, the G signal (F) obtained at the emitter of Q24 is non-additively mixed with the R (G) and B (H) signal through buffer Q25 and the highest signal (I) is detected. The signal (I) is fed to the Shading board through pin 17 of CN1 to set the lens iris automatically corresponding to the highest signal among R, G and B signals.

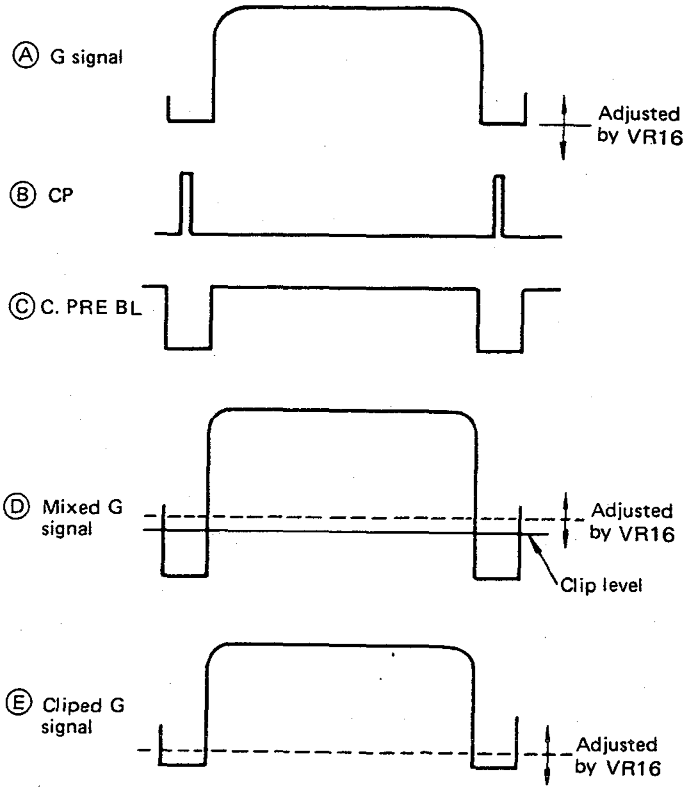


Fig. 5-1-3 Pedestal Setting

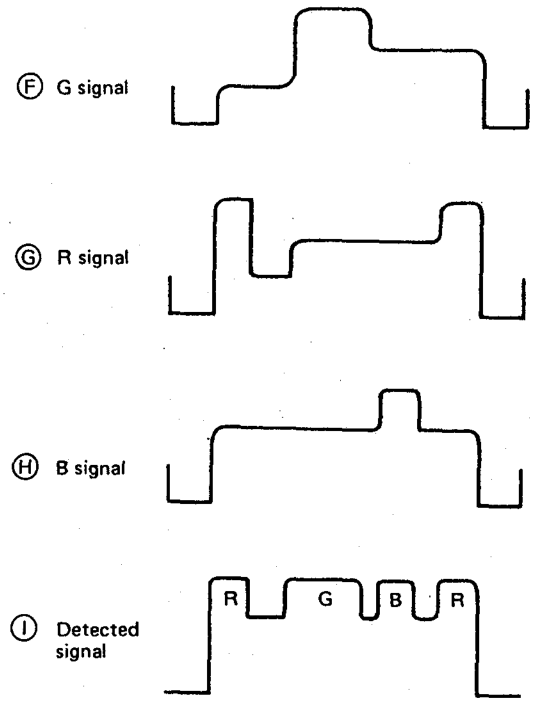


Fig. 5-1-4 NAM Mix

5-1-3 G Flare Compensation Circuit

The G signal obtained at the emitter of Q7 is sent through VR3 (G FLARE GAIN) to pin 2 of IC2 (a) and converted into DC voltage corresponding to the G signal level.
VR2 (G FLARE OFFSET) is a control for the offset DC voltage in order to match the compensation value to the G black level variation. The DC voltage obtained at pin 1 of IC2(a) is sent to pin 13 of analog switch IC1.The analog switch is controlled by the composite preblanking (C. PRE BL) pulse which is fed to the control terminal (pin 11) of IC1. During blanking, pins 13 and 14 of IC1 are connected and the flare compensation DC voltage is supplied to the base of Q11.

5-2 R Signal Processing Circuit

5-2-1 R Shading Correction Circuit

The red (R) signal (A) is supplied from pin 11 of CN1 through buffer Q26, VR5 (R INPUT GAIN) and CT2 (R FREQ.) to emitter of amplifier Q27 where the R signal is amplified and undergoes (or receives) the shading correction.
The R dark shading correction signal (B) from the shading board is sent through pin 14 of CN1 to pin 5 of analog switch IC5, and the R pulse cancel DC from the auto board is sent through pin 12 of CN1 to pin 3 of IC5.
The analog switch is controlled by the horizontal drive (HD) pulse (D) which it is fed to the control terminal (pin 9) of IC5. During the negative portion of HD pulse, pins 5 and 4 of IC5 are connected and the dark shading correction signal is fed through buffer Q77 to the emitter of Q27 where is mixed with the R signal (A) for correcting the dark shading.
During the positive portion of HD pulse, pins 3 and 4 of IC5 are connected and the R pulse cancel DC is fed through buffer Q77 to the emitter of Q27 in order to match the R pedestal level when the Auto White/Auto Black Set Switch in front of the camera is set to the ABC position, i.e, set the blanking level equal to active scan dark current. The R pulse cancel DC level is controlled by VR14 (R PULSE CANCEL) . The R signal (C) which undergoes the dark shading correction and the blanking offset (pulse cancel) control is sent to buffer Q28.
The R signal (E) at the emitter of Q28 is fed to clamp circuit Q29 where the R signal is clamped by the clamp pulse (CP) (F) supplied to the base of Q29 from pin 30 of CN1 through clamp pulse generator circuit consisting of IC10(a)~IC10(d). The clamped R signal is then sent to pin 2 of analog switch IC5. During the positive portion of preblanking signal, pins 1 and 15 of IC5 are connected and the noise during the blanking period is eliminated.

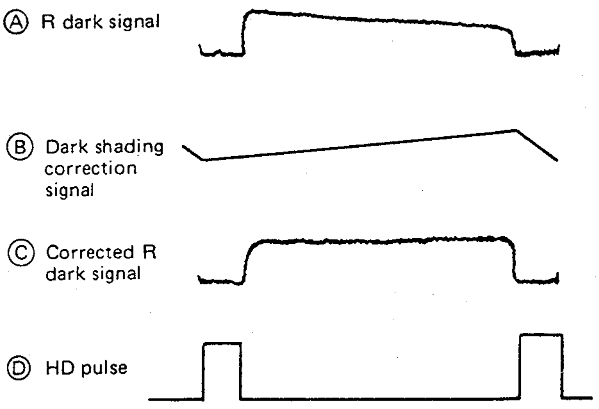


Fig. 5-2-1 Dark Shading Correction

The analog switch is controlled by the preblanking signal (PRE.BL) which is fed to pin 10 of IC5.
The R signal obtained at pin 15 of IC5 is sent to the white clip Q30/Q31 where the high level of R signal is clipped by DC voltage determined by dividing with R82 and R83.
The clipped R signal (H) is then sent through buffer Q32 to the gain control circuit.

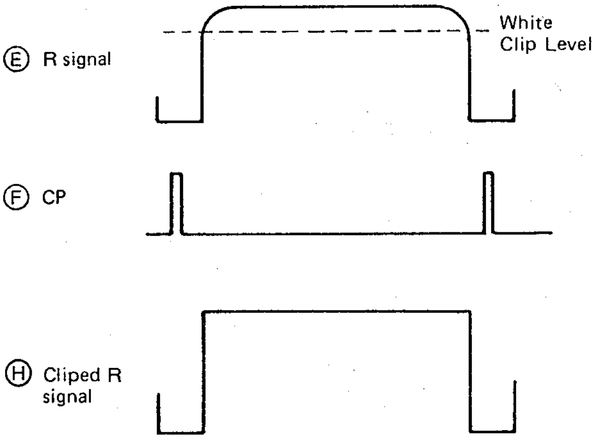


Fig. 5-2-2 White Clip

5-2-2 R Gain Control Circuit

The R signal from the dark shading correction circuit is fed to the high gain control circuit consisting of IC6 and Q33~Q36 . IC6 and Q33 control the gain and Q34~Q36 reduce the noise when the high gain selection switch is set to the +9dB or +18dB position.
When the high gain selection switch is selected to 0dB, +9dB or +18dB position, the DC potentials obtained at pins 23 and 21 of CN1 are supplied through Q80 and Q79 to the base of Q34 and Q35 respectively therefore, due to high (H) level or low (L) level at pins 23 and 21 of CN1, gain control Q34 and Q35 work as shown in the table below.

Position of High Gain Selection Switch	Pin23 of CN1	Pin21 of CN1	Q80	Q79	Q34	Q35
0 dB	H	H	OFF	OFF	OFF	OFF
+9 dB	L	H	ON	OFF	ON	OFF
+ 18dB	H	L	ON	ON	ON	ON

As a result, the gain of Q33 becomes minimum in the 0dB position. In the +9dB position, the gain of Q33 becomes triple of that in the 0dB position. In the + 18 dB position the gain of Q33 becomes eight times of that in the 0dB position.

Q34 and Q35 reduce the noise when the high gain selection switch is set to +9dB or + 18dB position.

When the switch is set to +9dB position, Q34 is turned ON and C33 is connected to the emitter of Q33.

When the switch is set to + 18dB position, Q34 and Q35 are turned ON and C33 and C34 are connected to the emitter of Q33.

In this way, the noise is reduced by limiting the frequency response of the amplifier.

The R signal whose gain is thus controlled is sent through pins 6 and 14 of IC6 and amplifier circuit consisting of Q37~Q40 to buffer Q41.

The R signal (A) obtained at the emitter of Q41 is fed to clamp circuit Q42 where the blanking level of R signal is clamped by the clamp pulse (CP) (B) supplied to the base of Q42 and the blanking level is set to the DC voltage at the emitter of Q42.

The R pedestal control signal is sent from pin 27 of CN1 to the emitter of Q42, and VR17 (R PEDESTAL) sets the pedestal level of the R signal by changing the clamped potential.

The R signal whose blanking potential is set is sent through buffers Q43 and Q44 to Q45 where the R signal is mixed with composite preblanking (C.PRE BL) signal (C) and the mixed R signal is sent to the black level clip circuit consisting of Q46~Q48 where the low level (C.PRE BL) portion of R signal is clipped.

As a result, the R signal (E) is made. The R signal is then sent through buffer Q49 and pin 22 of CN1 to the Process-2 board.

On the other hand, the R signal (G) obtained at the emitter of Q49 is non-additively mixed with the G (F) and B (H) signal through buffer Q50 and the highest signal (I) is detected. The signal (I) is fed to the Shading board through pin 17 of CN1 to set the lens iris automatically corresponding to the highest signal amang R, G and B signals.

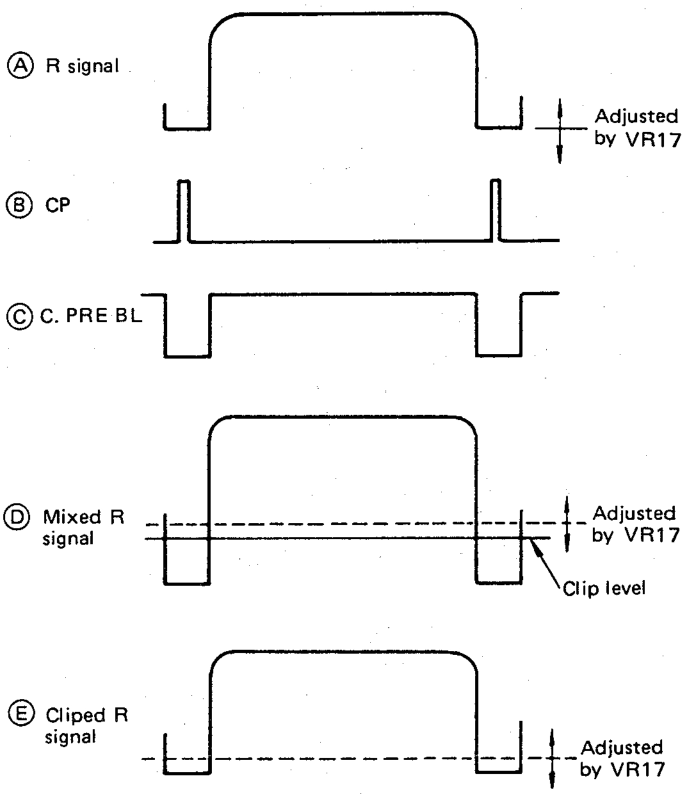


Fig. 5-2-3 Pedestal Setting

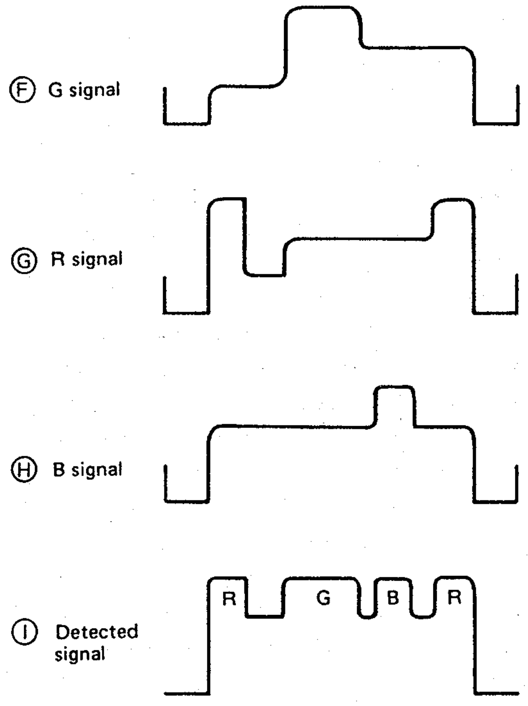


Fig. 5-2-4 NAM Mix

5-2-3 R Flare Compensation Circuit

The R signal obtained at the emitter of Q32 is sent through VR7 (R FLARE GAIN) to pin 6 of IC2 (b) and converted into DC voltage corresponding to the G signal level.
VR6 (R FLARE OFFSET) is a control for the offset DC voltage in order to match the compensation value to the G black level variation. The DC voltage obtained at pin 7 of IC2(b) is sent to pin 13 of analog switch IC5.The analog switch is controlled by the composite preblanking (C. PRE BL) pulse which is fed to the control terminal (pin 11) of IC5. During blanking, pins 13 and 14 of IC5 are connected and the flare compensation DC voltage is supplied to the base of Q36.

5-3 B Signal Processing Circuit

5-3-1 B Shading Correction Circuit

The blue (B) signal (A) is supplied from pin 2 of CN1 through buffer Q51, VR9 (B INPUT GAIN) and CT3 (B FREQ.) to emitter of amplifier Q52 where the B signal is amplified and undergoes (or receives) the shading correction.
The B dark shading correction sigual (B) from the shading board is sent through pin 5 of CN1 to pin 5 of analog switch IC7, and the B pulse cancel DC from the auto board is sent through pin 3 of CN1 to pin 3 of IC7.
The analog switch is controlled by the horizontal drive (HD) pulse (D) which is fed to the control terminal (pin 9) of IC7. During the negative portion of HD pulse, pins 5 and 4 of IC7 are connected and the dark shading correction signal is fed through buffer Q78 to the emitter of Q52 where it is mixed with the B signal (A) for correcting the dark shading.
During the positive portion of HD pulse, pins 3 and 4 of IC7 are connected and the B pulse cancel DC is fed through buffer Q78 to the emitter of Q52 in order to match the B pedestal level when the Auto White/Auto Black Set Switch in front of the camera is set to the ABC position, i.e, set the blanking level equal to active scan dark current. The B pulse cancel DC level is controlled by VR15 (B PULSE CANCEL) . The B signal (C) which undergoes the dark shading correction and the blanking offset (pulse cancel) control is sent to buffer Q53.
The B signal (E) at the emitter of Q53 is fed to clamp circuit Q54 where the B signal is clamped by the clamp pulse (CP) (F) supplied to the base of Q54 from pin 30 of CN1 through clamp pulse generator circuit consisting of IC10(a)~IC10(d). The clamped B signal is then sent to pin 2 of analog switch IC7. During the positive portion of preblanking signal, pins 1 and 15 of IC7 are connected and the noise during the blanking period is eliminated.

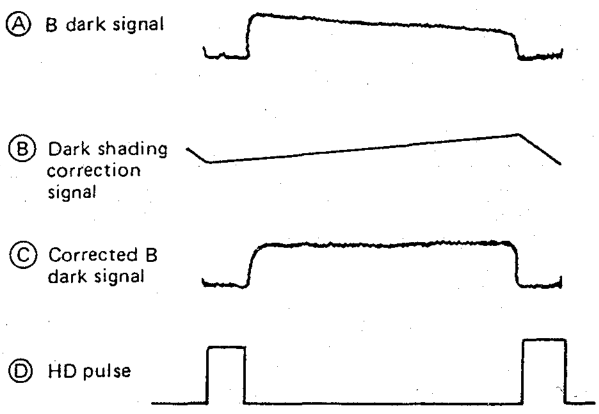


Fig. 5-3-1 Dark Shading Correction

The analog switch is controlled by the preblanking pulse (PRE.BL) which is fed to pin 10 of IC7.
The B signal obtained at pin 15 of IC7 is sent to the white clip Q55/Q56 where the high level of B signal is clipped by DC voltage determined by dividing with R151 and R152.
The clipped B signal (H) is then sent through buffer Q57 to the gain control circuit.

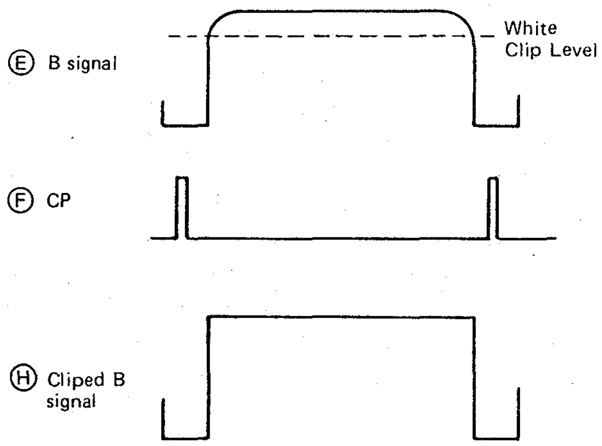


Fig. 5-3-2 White Clip

5-3-2 B signal Gain Control Circuit

The B signal from the dark shading correction circuit is fed to the high gain control circuit consisting of IC9 and Q58~Q61. IC9 and Q58 control the gain and Q59~Q61 reduce the noise when the high gain selection switch is set to the +9dB or +18dB position.
When the high gain selection switch is selected to 0dB, +9dB or +18dB position, the DC potentials obtained at pins 23 and 21 of CN1 are supplied through Q80 and Q79 to the base of Q59 and Q60 respectively therefore, due to high (H) level or low (L) level at pins 23 and 21 of CN1 gain control Q59 and Q60 work as shown in the table below.

Position of High Gain Selection Switch	Pin23 of CN1	Pin21 of CN1	Q80	Q79	Q59	Q60
0 dB	H	H	OFF	OFF	OFF	OFF
+ 9 dB	L	H	ON	OFF	ON	OFF
+ 18dB	H	L	ON	ON	ON	ON

As a result, the gain of Q58 becomes minimum in the 0dB position. In the +9dB position, the gain of Q58 becomes triple of that in the 0dB position. In the + 18 dB position the gain of becomes eight times of that in the 0dB position.

Q59 and Q60 reduce the noise when the high gain selection switch is set to +9dB or + 18dB position.

When the switch is set to +9dB position, Q59 is turned ON and C53 is connected to the emitter of Q58.

When the switch is set to + 18dB position, Q59 and Q60 are turned ON and C53 and C54 are connected to the emitter of Q58.

In this way, the noise is reduced by limiting the frequency response of the amplifier.

The B signal whose gain is thus controlled is sent through pins 6 and 14 of IC9 and amplifier circuit consisting of Q62~Q65 to buffer Q66.

The B signal (A) obtained at the emitter of Q66 is fed to clamp circuit Q67 where the blanking level of B signal is clamped by the clamp pulse (CP) (B) supplied to the base of Q67 and the blanking level is set to the DC voltage at the emitter of Q67.

The B pedestal control signal is sent from pin 27 of CN1 to the emitter of Q67, and VR18 (B PEDESTAL) sets the pedestal level of the B signal by changing the clamped potential.

The B signal whose blanking potential is set is sent through buffers Q68 and Q69 to Q70 where the B signal is mixed with composite pleblanking (C.PRE BL) signal (C) and the mixed B signal is sent to the black level clip circuit consisting of Q71~Q73 where the low level (C.PRE BL) portion of B signal is clipped.

As a result, the B signal (E) is made. The B signal is then sent through buffer Q74 and pin 18 of CN1 to thee Process-2 board.

On the other hand, the B signal (H) obtained at the emitter of Q74 is non-additively mixed with the G (F) and R (G) signal through buffer Q75 and the highest signal (I) is detected. The signal (I) is fed to the Shading board through pin 17 of CN1 to set the lens iris automatically corresponding to the highest signal amang R, G and B signals.

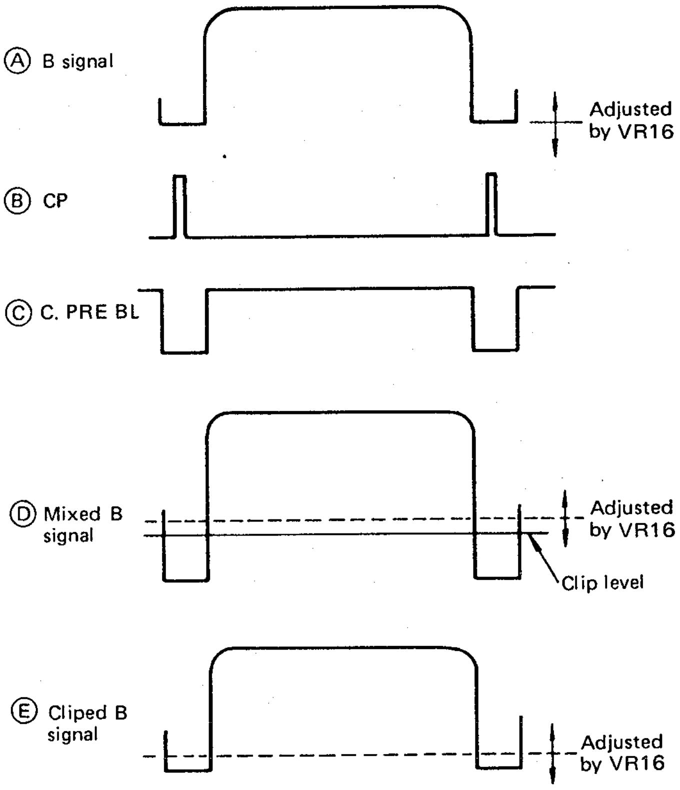


Fig. 5-3-3 Pedestal Setting

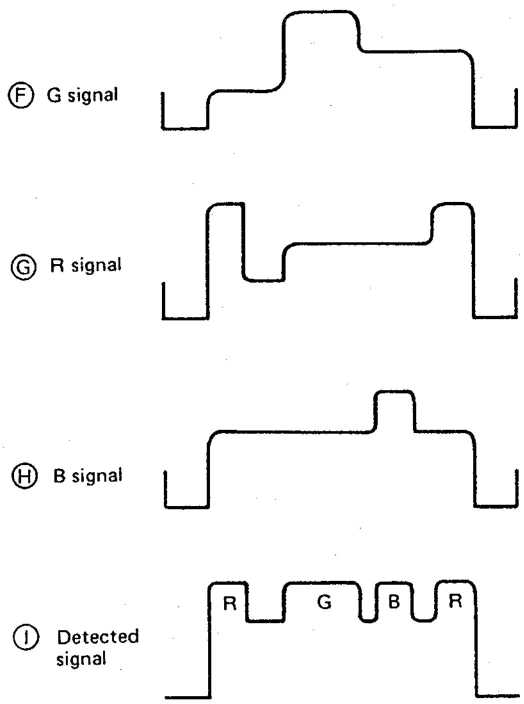


Fig. 5-3-4 NAM Mix

5-3-3 B Flare Compensation Circuit

The B signal obtained at the emitter of Q57 is sent through VR11 (R FLARE GAIN) to pin 2 of IC8 (a) and converted into DC voltage corresponding to the B signal level.
VR10 (B FLARE OFFSET) is a control for the offset DC voltage in order to match the compensation value to the B black level variation. The DC voltage obtained at pin 1 of IC8(a) is sent to pin 13 of analog switch IC7.The analog switch is controlled by the composite preblanking (C. PRE BL) pulse which is fed to the control terminal (pin 11) of IC7. During blanking, pins 13 and 14 of IC7 are connected and the flare compensation DC voltage is supplied to the base of Q61.

5-4 +2.5V DC Regulator Circuit

Approximately +2.5V DC made by dividing +8.8V DC with R239 and R240 is fed to pin 5 of operational amplifier IC8 (b) and output voltage at pin 7 is fed back to pin 6 of IC8(b).
In this way, regulated +2.5V is made.

6. Process-2 Board

- **6-1 G Signal Processing Circuit**
  - **6-1-1 G Gamma Correction Circuit**
  - **6-1-2 G/B Matrix Circuit**
- **6-2 R Signal Processing Circuit**
  - **6-2-1 R Gamma Correction Circuit**
  - **6-2-2 R/G Matrix Circuit**
- **6-3 B Signal Processing Circuit**
  - **6-3-1 B Gamma Correction Circuit**
  - **6-3-2 B/R Matrix Circuit**
- **6-4 +8.8V / −4.4V Regulator Circuit**

6-1 G Signal Processing Circuit

6-1-1 G Gamma Correction Circuit

This circuit corrects the non-linear photoelectric conversion characteristic of cathode ray tube (CRT) and reproduces a linear picture of high fidelity on the color monitor. In order for a televised picture to have the same contrast gradation as the original scene, the system (including the CCD image sensor, signal processing inside camera and monitor, and CRT) gamma must be equal to 1.
The gamma characteristic of CCD image sensor is approx. 1.0 and the gamma characteristic of the monitor CRT is approx. 2.2, so that the gamma characteristic of the gamma correction circuit should be approx. 0.45, which makes the total gamma to be approx. 1.0 as shown in Fig 6-1.

The G signal from the Process-1 board is fed to the gamma correction circuit consisting of Q1 ~Q6. The G signal level rises above the level set by the differential amplifiers consisting of Q1/Q6, Q2/Q5 and Q3/Q4, the defferential amplifiers are turned ON one by one to attenuate the G signal through the divider such as R1 to R12, R13 or R14 with VR1 (G GAMMA GAIN).

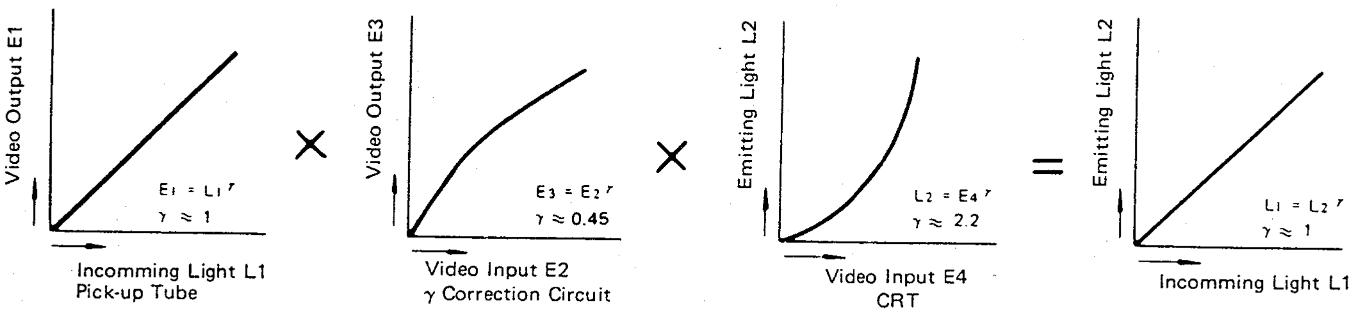


Fig. 6-1 Gamma Correction

The gamma corrected G signal is sent to clamp circuit Q8 through buffer Q7 where the blanking level of G signal is clamped at the emitter potential +2.5V. The fine gamma corrected G signal is then fed to VR2 (G HI-GAIN GAMMA) through buffer Q9. On the other hand, uncorrected (linear) G signal is supplied to VR2 through buffer Q10 and VR21 (G GAMMA), and the gamma corrected G signal and uncorrected G signal is mixed at VR2, which sets the gamma correction characteristic to approx 0.45.

When the High Gain Selection Switch on the side of camera is set to +18dB (Gain-2) position, the low (L) level is supplied to the base of Q11 through pin 12 of CN1 and Q11 is turned ON. As a result, only VR2 (G HI-GAIN GAMMA) operates when the High Gain Selection Switch is set to +18dB position.

The gamma corrected G signal obtained at the wiper arm of VR2 is sent to the Detail board through buffer Q12 and pin 3 of CN1 in order to make the apperture signal from the G signal.

In the Detail board, the G signal is delayed approximately 180 ns for making apperture signal and the non-delayed G signal from pin 5 of CN1 is then supplied to delay line DL1 where the 1H delayed G signal is delayed 180ns in order to match it with the aperture signal in phase, and it is sent to the G/B matrix circuit through phase shifter Q80.

6-1-2 G/B Matrix Circuit

This circuit is a color reproduction fine adjusting circuit for color matching between two or more color cameras.

The G signal is sent from the emitter of buffer Q13 through VR3 (G GAIN) to amplifier Q14 where the G signal is mixed with apperture signal, (G-B) signal and (G-R) signal.

The G signal is also supplied from the emitter of Q13 to the base of differential amplifier Q62, and the B signal from the emitter of Q53 is supplied to the base of Q63. As a result, a positive B signal and a negative G signal (B-G) are obtained at the collector of Q62, and a positive G signal and a negative B signal (G-B) at the collector of Q63.

The (B-G) signal is mixed with the B signal at the emitter of Q54 through VR10 (B+(B-G)), buffer Q65 and R105, and B± (B-G) signal is obtained depending on the setting of VR10.

The (G-B) signal is mixed with the G signal at the emitter of Q14 through VR11 (G+(G-B)), buffer Q66 and R28, and G± (G-B) signal is obtained depending on the setting of VR11.

When a black and white object is picked up, no correction signal is supplied to the emitter of Q54 or Q14 regardless of the position of VR10 or VR11 because the level of B and G signals that are supplied to Q63 and Q62 are the same.

It is in this way that color reproduction is adjusted without affecting the white balance.

SW1 (MATRIX ON/OFF SWITCH) controls the bias voltage of the differential amplifier and turn OFF the constant current transistor Q64 in the OFF position of SW1.

The G signal is then supplied through buffer Q13 and VR3 (G GAIN) to the emitter of Q14 where the detail signal from the Detail board, (G-B) signal and (R-G) signal are mixed with the G signal for matching the color between two or more cameras.

The G signal obtained at the collector of Q14 is fed through buffer Q15 to the clamp circuit Q16 where the blanking period of G signal is clipped by the clamp pulse which is supplied to the base of Q16.

The G signal is then fed through buffer Q17 to the black clip Q19/Q20 where its low level is clipped setting the pedestal level, and the G signal obtained at the emitter of Q19 and Q20 is sent through pin 8 of CN1 to the Encoder board.

6-2 R Signal Processing Circuit

6-2-1 R Gamma Correction Circuit

This circuit corrects the non-linear photoelectric conversion characteristic of cathode ray tube (CRT) and reproduces a linear picture of high fidelity on the color monitor in the same manner as G signal.

The R signal level rises above the Process-1 board is fed to the gamma correction circuit consisting of Q21 ~Q26. The R signal from the level set by the differential amplifiers consisting of Q21/Q26, Q22/Q25 and Q23/Q24. The defferential amplifiers are turned ON one by one to attenuate the R signal through the divider such as R40 to R50, R51 or R52 with VR4 (R GAMMA GAIN).

The gamma corrected R signal is sent through buffer Q27 to clamp circuit Q28 where the blanking level of R signal is clamped at the emitter potential +2.5V. The fine gamma corrected R signal is then fed to VR5 (R HI-GAIN GAMMA) through buffer Q29. On the other hand, uncorrected (linear) R signal is supplied to VR5 through buffer Q30 and VR22 (R GAMMA), and the gamma corrected R signal and uncorrected R signal is mixed at VR5, which sets the gamma correction characteristic to approx 0.45.

When the High Gain Selection Switch on the side of camera is set to +18dB (Gain-2) position, the low (L) level is supplied to the base of Q31 through pin 12 of CN1 and Q31 is turned ON. As a result, only VR5 (R HI- GAIN GAMMA) operates when the High Gain Selection Switch is set to +18dB position.

The gamma corrected R signal obtained at the wiper arm of VR5 is sent to delay line DL2 where the R signal is delayed 180ns in order to match it with the aperture signal in phase, and it is sent to the R/G matrix circuit through phase shifter Q81.

VR19 (R PHASE) control for setting the phase of delayed R signal matches to that of G signal.

6-2-2 R/G Matrix Circuit

This circuit is a color reproduction fine adjusting circuit for color matching between two or more color cameras.

The R signal is sent from the emitter of buffer Q33 through VR6 (R GAIN) to amplifier Q34 where the R signal is mixed with apperture signal, (R-B) signal and (R-G) signal.

The R signal is also supplied from the emitter of Q33 to the base of differential amplifier Q67 and the G signal from the emitter of Q13 is supplied to the base of Q68. As a result, a positive G signal and a negative G signal (G-R) are obtained at the collector of Q67, and a positive R signal and a negative G signal (R-G) at the collector of Q68.

The (G-R) signal is mixed with the G signal at the emitter of Q14 through VR12 (G + (G-R)) , buffer Q70 and R29, and G ± (G-R) signal is obtained depending on the setting of VR12.

The (R-G) signal is mixed with the R signal at the emitter of Q34 through VR13 (R + (R-G)) , buffer Q71 and R68, and R ± (R-G) signal is obtained depending on the setting of VR13.

If a black and white object is picked up, no correction signal is supplied to the emitter of Q14 or Q34 regardless of the position of VR12 or VR13 because the level of G and R signals that are supplied to Q67 and Q68 are the same.

It is in this way that color reproduction is adjusted without affecting the white balance.

SW1 (MATRIX ON/OFF SWITCH) controls the bias voltage of the differential amplifier and turns OFF the constant current transistor Q69 in the OFF position of SW1.

The R signal is then supplied through buffer Q33 and VR6 (R GAIN) to the emitter of Q34 where the detail signal from the Detail board, (R-B) signal and (R-G) signal are mixed with the R signal for matching the color between two or more cameras.

The R signal obtained at the collector of Q34 is fed through buffer Q35 to the clamp circuit Q36 where the blanking period of R signal is clamped by the clamp pulse which is supplied to the base of Q36.

The R signal is then fed through buffer Q37 to the black clip Q39/Q40 where its low level is clipped setting the pedestal level, and the R signal obtained at the emitter of Q39 and Q40 is sent through pin 9 of CN1 to the Encoder board.

6-3 B Signal Processing Circuit

6-3-1 B Gamma Correction Circuit

This circuit corrects the non-linear photoelectric conversion characteristic of cathode ray tube (CRT) and reproduces a linear picture of high fidelity on the color monitorr in same manner as G signal.

The B signal from the Process-1 board is fed to the gamma correction circuit consisting of Q41 ~Q46. The B signal level rises above the level set by the differential amplifiers consisting of Q41/Q46, Q42/Q45 and Q43/Q44, the defferential amplifiers are turned ON one by one to attenuate the B signal through the divider such as R78 to R88, R89 or R90 with VR7 (B GAMMA GAIN).

The gamma corrected B signal is sent through buffer Q47 to clamp circuit Q48 where the blanking level of B signal is clamped at the emitter potential +2.5V.

The fine gamma corrected B signal is then fed to VR8 (B HI-GAIN GAMMA) through buffer Q49. On the other hand, uncorrected (linear) B signal is supplied to VR8 through buffer Q50 and VR23 (B GAMMA), and the gamma corrected B signal and uncorrected B signal is mixed at VR7, which sets the gamma correction characteristic to approx 0.45.

When the High Gain Selection Switch on the side of camera is set to +18dB (Gain-2) position, the low (L) level is supplied to the base of Q51 through pin 12 of CN1 and Q51 is turned ON. As a result, only VR8 (B HI- GAIN GAMMA) operates when the High Gain Selection Switch is set to +18dB position.

The gamma corrected B signal obtained at the wiper arm of VR7 is sent to delay line DL3 where the B signal is delayed 180ns in order to match it with the aperture signal in phase, and it is sent to the B/R matrix circuit through phase shifter Q82.

VR20 (B PHASE) control for setting the phase of delayed B signal matches to that of G signal.

6-3-2 B/R Matrix Circuit

This circuit is a color reproduction fine adjusting circuit for color matching between two or more color cameras.

The B signal is sent from the emitter of buffer Q53 through VR9 (B GAIN) to amplifier Q54 where the B signal is mixed with apperture signal, (B-G) signal and (B-R) signal.

The B signal is also supplied from the emitter of Q53 to the base of differential amplifier Q72 and the R signal from the emitter of Q33 is supplied to the base of Q73. As a result, a positive R signal and a negative B signal (R-B) are obtained at the collector of Q72, and a positive B signal and a negative R signal (B-R) at the collector of Q73.

The (R-B) signal is mixed with the R signal at the emitter of Q34 through VR14 (R + (B-R)) , buffer Q75 and R67, and R ± (B-R) signal is obtained depending on the setting of VR14.

The (B-R) signal is mixed with the B signal at the emitter of Q54 through VR15 (B + (B-R)) , buffer Q76 and R106, and B ± (B-R) signal is obtained depending on the setting of VR15.

If a black and white object is picked up, no correction signal is supplied to the emitter of Q34 or Q54 regardless of the position of VR14 or VR15 because the level of R and B signals that are supplied to Q72 and Q73 are the same.

It is in this way that color reproduction is adjusted without affecting the white balance.

SW1 (MATRIX ON/OFF SWITCH) controls the bias voltage of the differential amplifier and turns OFF the constant current transistor Q74 in the OFF position of SW1.

The B signal is then supplied through buffer Q53 and VR9 (B GAIN) to the emitter of Q54 where the detail signal from the Detail board, B + (B-G) signal and B + (B-R) signals are mixed with the R signal for matching the color between two or more cameras.

The R signal obtained at the collector of Q54 is fed through buffer Q55 to the clamp circuit Q56 where the blanking period of B signal is clamped by the clamp pulse which is supplied to the base of Q56.

The R signal is then fed Q57 to the black clip Q59/Q60 where its low level is clipped setting the pedestal level, and the B signal obtained at the emitter of Q59 and Q60 is sent through pin 7 of CN1 to the Encoder board.

6-4 +8.8V / −4.4V Regulator Circuit

This circuit consisting of IC1, Q78 and Q79 generates +8.8V and −4.4V DC power.

- **+8.8V Regulator Circuit**

  The +8.8V DC voltage is produced by IC1 (a) and Q78, and it is obtained at the collector of Q78.

  The output voltage is fed back to pin 5 of IC1 (a) by dividing the +8.8V DC voltage using R149 and R150 for stabilizing the +8.8V DC voltage. Also, +4.6V generated by dividing +9.2V DC voltage using R151 and R152 is supplied to pin 6 of IC1 (a) as reference voltage.
- **−4.4V Regulator Circuit**

  The −4.4V DC voltage is produced by IC1 (b) and Q79, and it is obtained at the collector of Q79.

  The output voltage is fed back to pin 3 of IC1 (b) by dividing the −4.4V DC voltage using R155 and R157 for stabilizing the −4.4V DC voltage. Also, −2.4V generated by dividing −4.8V DC voltage using R156 and R158 is supplied to pin 2 of IC1 (b) as reference voltage.

7. Encoder Board

7-1 Color Bar Generator Circuit
7-2 Y Matrix Circuit
7-3 Video Output Circuit
7-4 V Matrix/Balance Modulator Circuit
7-5 U Matrix/Balance Modulator Circuit
7-6 Chroma Output Circuit
7-7 Subcarrier (SC) Output Circuit
7-8 Burst Output Circuit
7-9 Sync Output Circuit
7-10 Zebra Control Circuit
7-11 Character Mix/Return Video Control Circuit
7-12 +3V / +8.8V Regulator Circuit

7-1 Color Bar Generator Circuit

A color bar generator IC1 oscillates the EBU color bar pulse whose oscillating frequency is set to approximately 1.864MHz by CT1 (BAR WIDTH). When the color bar/camera selection switch on the side of camera is set to the Bar position, the low potential is sent to pin 1 of IC1 through pin 3 of CN1. The color bar start pulse (HD) (A) is fed to pin 7 of IC1 from pin 27 of CN1 resets the oscillator. The color bar start timing is controlled by VR1 (BAR START) which is connected to pins 6 and 9 of IC1.

As a result, the B bar signal (B) obtained at pin 20 of IC1,the R bar signal (C) at pin 19 of IC1 and the G bar signal (D) at pin 18 of IC1 are fed to pins 5, 12 and 2 of camera/bar selector IC2.

IC1 MN50005LVD
Pin Identification

Pin No.	Name	In/Out	Description
1	BAR/CAM	In	Bar/Camera Selection Input (L:BAR)
2	CONT	Out	Oscillator Timing Output
3	X_I	In	Internal Oscillator Input
4	X_O	Out	Internal Oscillator Input
5	V_{SS2}	-	Ground
6	T	In	Color Bar Start Timing Input
7	H1	In	Color Bar Start Pulse Input (HD)
8	H2	In	Color Bar Start Input
9	M	In	Color Bar Start Timing Input
10	3/4 PULSE	-	Not Used
11	I	Out	I (In-Phase) Output
12	W	Out	W (White) Output
13	Q	Out	Q (Quad-Phase) Output
14	V_{SS}	-	Ground
15	V_{DD2}	In	+5V DC Power

16	+4	Out	+4 IRE Setup Signal Output (SMPTE only)
17	−4	Out	−4 IRE Setup Signal Output (SMPTE only)
18	G	Out	G Bar Signal Output
19	R	Out	R Bar Signal Output
20	B	Out	B Bar Signal Output
21	EBU	Out	EBU White Level Mix Signal Output (100IRE)
22	ID2	In	ID Position Control-2
23	ID1	In	ID Position Control-1
24	ID0	In	ID ON/OFF Control
25	SMPTE/EIA	In	SMPTE/EIA Selection Input (L:EIA)
26	SMPTE/FULL	In	SMPTE/FULL Selection Input (L:FULL/EBU)
27	VD	In	Vertical Drive Pulse Input
28	V_{DD}	In	+5V DC Power

When the color bar/camera selection switch is set to the CAMERA position, the potential at pin 1 of IC1 becomes high level, and the oscillator stops oscillating.

The R, G and B color bar signals are supplied to pins 12, 2 and 5 of analog switch IC2 from pins 19, 18 and 20 respectively.

The R, G and B signals picked up by the CCD image sensors and processed in the Process-1 and 2 board are fed to pins 13, 1 and 3 through pins 17, 13 and 11 of CN1 from the process-2 board.

When the color bar/camera selection switch on the side of camera is set to the BAR position, potential at control terminal (pins 9, 10 and 11) of analog swich IC2 becomes low level and the bar signals are selected in IC2.

When the color ber/camera selection switch is set to the CAMERA position, the potential at pins 9, 10 and 11 of IC2 becomes high level and the signals from the process-2 board are selected in IC2. The selected R, G and B signals obtained at pins 14, 15 and 4 of IC2 are sent through respective buffers Q3, Q2 and Q1 to the Y matrix, V (R-Y) matrix and U (B-Y) matrix circuit.

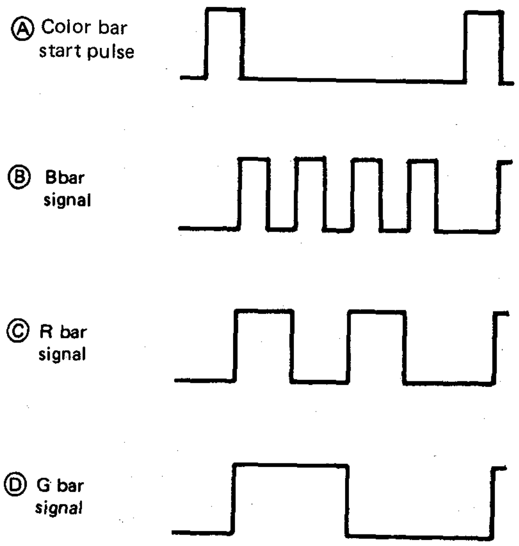


Fig 7-1 Color Bar Pulses

7-2 Y Matrix Circuit

The R, G and B signals are supplied from the camera/bar selection analog switch through resistance-matrix consists of R23~R27 to the emitter of mixer Q4 where they are mixed in the fixed proportion as shown below and the luminance (Y) signal is made.

$$Y = 0.59G + 0.3R + 0.11B$$

When the color bar/camera selection switch is set to the BAR position, the EBU bar signal for color bar is sent from pin 21 of IC1 to the emitter of mixer Q4, and it is mixed with the Y signal.

The Y signal obtained at the collector of Q4 is sent through buffer Q5 to clamp circuit inside IC3 (analog switch pins 3, 4, 5 and 9) where the blanking level of Y signal is clamped by switching IC3, which is controlled by the clamp pulse, and the blanking level becomes the DC voltage which is determined by dividing +8.8V with R38~R41.

The clamped Y signal (A) is sent through buffer Q6 to analog switch IC3. The composite blanking (C. BL) signal (B) is fed to control terminal (pin 10) of IC3 and pin 2 is connected to pin 15 during negative period of C.BL signal. As a result, the DC voltage during the C. BL period is set by VR2 (BAR SETUP) or VR3 (CAMERA SETUP) through pins 12 or 13, pin 14 of IC3 and buffer Q7 to pin 2 of IC3 and the pedestal level of Y signal (C) is set.

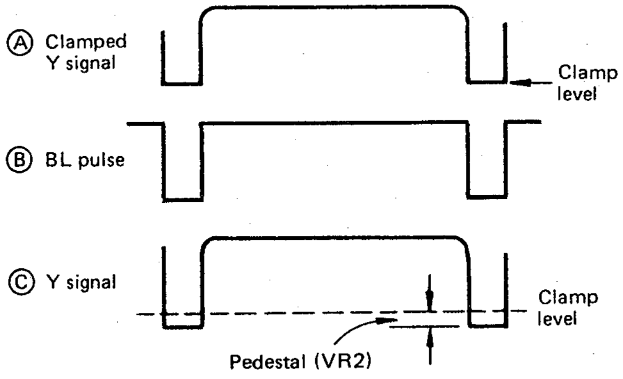


Fig 7-2 Y Pedestal

When the color bar/camera selection switch is set to the BAR position, potential at control terminal (pin 11) of IC3 becomes low level and pin 12 is connected to pin 14.

Therefore, the pedestal level of Y signal for color bar is adjusted by VR2 through buffer Q7.

When the selection switch is set to the CAMERA position, potential at pin11 of IC3 becomes high level and the pedestal level of Y signal can be set by VR3 through buffer Q7.

The Y signal obtained at pin 15 of IC3 is sent to the other circuit board through buffer Q9 and pin10 of CN1 and to the zebra control circuit through buffer Q11.

On the other hand, the Y signal at the base of buffer Q8 is sent through VR17 (Y GAIN) to the emitter of amplifier Q10 where the composite sync signal fed to VR14 (SYNC LEVEL) is mixed with the Y signal to conform the composite Y signal. The composite Y signal obtained at the collector of Q10 is sent to the character mix/return video control circuit through buffer Q13. The composite Y signal is also fed through Q12 to delay lines DL1 and DL2 which delays the Y signal to 350ns for matching the chrominance signal in phase.

The delayed composite Y signal is sent through buffer Q56 and pin 33 of CN1 to the other circuit board.

The delayed composite Y signal is fed through buffer Q14 to the emitter of amplifier Q15 where the chrominance signal fed to VR15 (CHROMA GAIN) is mixed with the composite Y signal to conform the composite video signal.

7-3 Video Output Circuit

The composite video signal at the collector of Q15 is supplied through buffer Q16, video output Q19~Q22 and pins 2 and 8 of CN1 to the video output connector (BNC) and 32 pin VTR/RCU connector on the rear of camera.

7-4 V Matrix / Balance Modulator Circuit

The R signal is supplied from the camera/bar selector IC2 to the base of mixer Q23 through R86 and VR4 (V WHITE BAL). The G and B signals are fed to the emitter of Q23 through resistance-matrix R87/R88 and R89 respectively.

The R, G and B signals are resistance-matrixed in the fixed proportion as shown below, and the V (R-Y) signal is obtained at the collector of Q23

$$V = 0.70R - 0.59G - 0.11B$$

On the other hand, when the color bar/camera selection switch is set to the BAR position, the V (R-Y) bar signal for EBU color bar is sent from pin 11 of IC1 through resistance-matrix consisting of R90 and R91 to the emitter of mixer Q23, and it is mixed with the V signal made by resistance-matrix R86~R89.

The V signal thus obtained at the collector of Q23 is sent through the 1.5MHz low pass filter (LPF) consisting of R94, R95, C28, C29 and Q24 and buffer Q25 to the base of Q26.

At the base of Q26, the V signal is mixed with the burst flag pulse (BFP) supplied from VR12 (BURST PHASE) for generating the burst signal.

VR12 adjusts the phase of burst signal.

The mixed signal is applied through amplifier Q27 and clamp Q28 to pin 1 of balance modulator IC4.

SW1 (V ON/OFF SWITCH) is used for adjusting the quadrature between V and U subcarrier signal. When SW1 is set to the OFF position, the V signal is removed and no signal is sent to the balance modulator (chrominance) circuit.

The V signal level is controlled by VR18(I LEVEL).
In IC4, the V signal modulates the 90° delayed subcarrier (SC) signal supplied from pin 3 of IC 4.
The modulated V signal at pin 7 of IC4 is mixed with the modulated U signal at the base of Q29.
VR9 (V CAN) adjusts the DC level at pin 5 of IC4 to minimize the carrier leak from the modulator.

7-5 U Matrix / Balance Modulator Circuit

The G signal is supplied from the camera/bar selector IC2 to the base of mixer Q36 through R137 and VR7 (U WHITE BAL).
The R and B signals are fed to the emitter of Q36 through resistauce-matrix R141 and R139/R140 respectively.
The R, G and B signals are resistance-matrixed in the fixed proportion as shown below, and the U (B-Y) signal is obtained at the collector of Q36.

$$\cdot\ U = -0.30R - 0.59G + 0.89B$$

On the other hand, when the color bar/camera selection switch is set to the BAR position, the U (B-Y) bar signal for EBU color bar is sent from pin 13 of IC1 through resistance-matrix consists of R141 and R142 to the emitter of mixer Q36, and it is mixed with the U signal which is made by resistance-matrix R137 ~ R141.
The U signal obtained at the collector of Q36 with this way is sent through 0.5MHz low pass filter (LPF) consisting of R145,R146, C57, C58 and Q37, amplifier Q39 and buffer Q40 to base of Q41.
At the base of Q41, the U signal is mixed with the burst flag pulse (BFP) supplied from VR12 (BURST PHASE) for making the burst signal. The mixed signal is applied through buffer Q42 and clamp Q43 to pin 1 of balance modulator IC6.
SW2 (U ON/OFF SWITCH) is used for adjusting the quadrature between V and U subcarrier signal. When SW2 is set to the OFF position, the U signal is removed and no signal is sent to the balance modulator (chrominance) circuit.
In IC6, the U signal modulates the subcarrier (SC) signal supplied through pin 3 of IC6.

The modulated U signal at pin 7 of IC6 is mixed with the modulated I signal at the base of Q29.
VR10 (U CAN) adjusts the DC level at pin 5 of IC6 to minimize the carrier leak from the modulator.

7-6 Chroma Output Circuit

The chrominance signal (A) obtained at the emitter of buffer Q29 is sent to pin 5 of analog switch IC5. The chrominance signal is also fed through integrated circuit consisting of R114 and C39 to pin 3 of IC5.
The burst flag pulse (BFP) (B) and composite blanking (C. BL) pulse (C) are fed to pins 5 and 6 of IC9 (b) from pins 29 and 25 of CN1 respectively. They are mixed and inverted in IC9(b) and the noise suppress signal (D) is obtained at pin 4 of IC9(b).

It is then supplied to the control terminal (pin 9) of analog switch IC5.
During the negative portion of noise suppress signal, pins 5 and 4 of IC5 are connected and pins 3 and 4 are connected during the positive portion.
As a result, the noise suppressed chroma signal (E) is obtained at pin 4 of IC5.
The chrominance signal obtained at pin 4 of IC5 is then fed to band pass filter (BPF) consisting of L5, L6, C43, C44, C46 and CT2 where harmonics of 4.43MHz is removed from the chrominance signal and sine-wave of chrominance signal remains.
The chrominance signal is further sent through buffer Q31 to the other circuit board and video output circuit.
The center frequency of band pass filter is controlled by CT2 (CHROMA FREQ.).

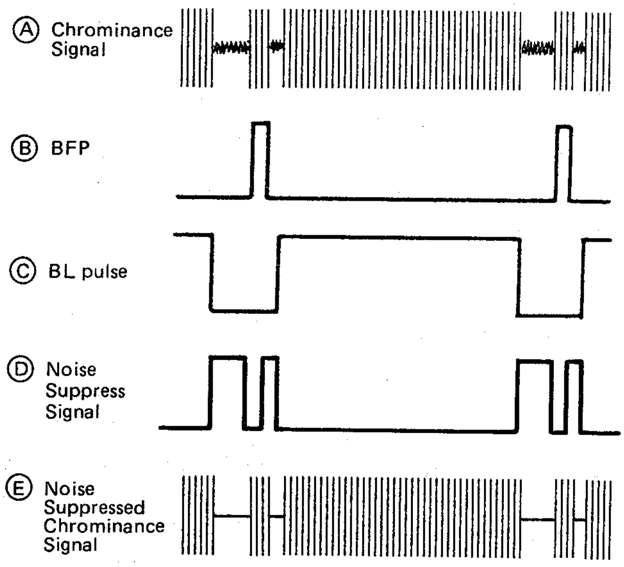


Fig. 7-3 Chroma Signal Noise Suppress

7-7 Subcarrier (SC) Output Circuit

The SC signal from Sync board is supplied to base of Q46 through pin 28 of CN1. The SC signal is shifted approx. 45° by C71, R177 and VR16 (QUAD). This signal is supplied through buffer Q48 and VR8 (SUB-QUAD) to pin 3 of IC8.
Also the 45° phase shifted SC signal is supplied through inverter Q49 where the 45° phase shifted SC signal is inverted and -45° phase shifted SC signal is made. The signal is supplied through buffer Q50 to pin 5 of IC8.
The control terminal at pin 9 of IC8 is controlled by the DC bias from pin 15 of IC8 and the control terminal of pin 10 is controlled by PAL square pulse from pin 30 of CN1.
While positive portion of PAL square signal, pin 15 is low (L) level and -45° phase shifted SC signal is obtained at pin 4 and negative portion of PAL square signal, pin 15 is high (H) level and +45° phase shifted SC signal is obtained at pin 4.
Thesed signal is supplied to pin 3 of balance modulator IC4 for reproducing each 90° phase shifted R-Y signal.
On the other hand, SC signal at emitter of Q46 is supplied to pin 3 of balance modulator IC6 for producing B-Y signal.

7-8 Burst Output Circuit

The burst flag pulse (BFP) from pin 29 of CN1 is fed through pins12 and 13 of INVERT AND gate IC9 (d) to the base of buffer Q51, and it is then sent through the low pass filter (LPF) consisting fo R190, R191, C80 and buffer Q52 to VR11 (BURST GAIN) and VR12(BURST PHASE).

The burst flag pulse fed through VR11 and VR12 is mixed with the V and U signals at the base of Q26 and Q41 respectively for making the burst signal.

7-9 Sync Output Circuit

The composite sync pulse from pin 22 of CN1 is fed through the buffer Q53, the low pass filter (LPF) consisting of R197, R198, C82, C83 and buffer Q54, and VR14 (SYNC LEVEL) to the Y matrix circuit where it is mixed with the Y signal at the emitter of Q10.

7-10 Zebra Control Circuit

This circuit generates a zebra signal from signals which exceed a specified level (0.7V) and supplies it to the EVF through the character mix / return video control together with the video signal.

When the camera/bar selection switch is set to the camera position, low level is fed through pins 1 and 2 of NOR gate IC9 (a) to pin 8 of INVERT OR gate IC9 (c).

On the other hand, when the zebra ON/OFF switch is set to ON position, low level is fed through pin 5 of CN1 to pin 9 of IC9 (c). As a result, high level is obtained at pin 10 of IC9 (c) and Q55 is then turned ON, and the DC voltage set by VR13 (ZEBRA ADJ) is mixed with 1/4 subcarrier (SC) signal fed from pin 21 of CN1. The 1/4 SC signal ridden on the DC voltage (A) is then fed to pin 5 of IC10 where it is compared with the Y signal (B).

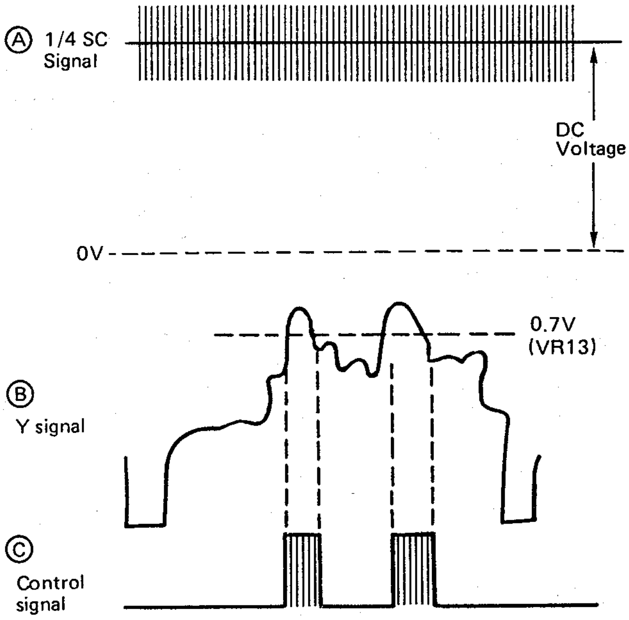


Fig. 7-4 Zebra Signal

As a result, the Y signal whitch exceeds 0.7V turns to the zebra signal (C) and it is sent to the charactor DC mix / return video control signal.

When the camera/bar selection switch is set to the bar position or the zebra ON/OFF switch is set to the OFF position, potential at pin10 of IC9(c) becomes L level turning ON Q55.

The DC voltage set by VR13 increases exceeding the Y signal level.

As a result, the zebra signal is not displayed even if the Y signal exceeds 0.7V.

7-11 Character Mix / Return Video Contrrol Circuit

This circuit receives the character signal, zabra signal and Y signal, and makes EVF video signal.

The Y signal obtained at the emitter of buffer Q13, zebra signal from zebra controlcircuit and character signal from the Auto board are mixed at the emitter of Q32 and the mixed signal is fed to pin 1 of analog switch IC5 through amplifier Q32/Q33.

On the other hand, the return video signal is supplied to pin 2 of IC5 from pin 20 of CN1 through buffer Q34.

The analog switch IC5 consisting of pins 1, 2 and 15 is controlled by return video control signal supplied to the control terminal pin 10 from pin 19 of CN1.

When the Return Video Button on the lens is kept pressed, the return control signal at pin 10 of IC5 becomes low (L) level and pins 2 and 15 of IC5 is connected. Therefore, the return video signal is sent to the EVF through buffer Q35 and pin 9 of CN1.

When the Return Video Button is not pressed, the return video control signal at pin 10 becomes high (H) level and pins 1 and 15 is connected. Therefore, the Y signal which is mixed with character signal and zebra signal is supplied to the EVF through buffer Q35 and pin 9 of CN1.

7-12 +3V / +8.8V Regulator Circuit

This circuit consisting of IC7, Q44 and Q45 generates +8.8V and +3V DC power.

o +8.8V Regulator Circuit

The +8.8V DC voltage is produced by IC7 (a) and Q45, and it is obtained at the collector of Q45.

The output voltage is fed back to pin 3 of IC7 (a) by dividing the +8.8V DC voltage using R168 and R169 for stabilizing the +8.8V DC voltage. Also, +4.8V generated by dividing +9.6V DC voltage using R170 and R171 is supplied to pin 2 of IC7 (a) as reference voltage.

o +3V Regulator Circuit

The +3V DC voltage is produced by IC7 (b) and Q44, and it is obtained at the emitter of Q44.

The output voltage is fed back to pin 6 of IC7 (b) for stabilizing the +3V DC voltage. Also, +3.2V generated by dividing +8.8V DC voltage using R164 and R165 is supplied to pin 5 of IC7 (b) as reference voltage.

8. Detail Board

8-1. Phase Lock Loop (PLL) Circuit
8-2. 1H Delay G Signal Generator Circuit
8-3. 2H Delay G Signal Generator Circuit
8-4. Aperture Signal Generator Circuit
8-5. Level Dependent Control Circuit
8-6. Detail Signal Output Circuit
8-7. +9V Regulator Circuit

8-1 Phase Lock Loop (PLL) Circuit

This circuit generates 21MHz clock pulse signal for 1H-delay CCD whose phase coincides with HD pulse from Sync board. Approx. 21MHz (fH × 680 × 2) pulse generated by voltage controlled oscillator (VCO) consisting of IC5 (a), L2, CT1 (PLL LOCK), C6, C7 and variable capacitance diode D6 is supplied to pin 14 of 1H-delay CCD IC7 and IC10 through IC5 (c).

This clock pulse is also fed through IC5 (b) to pin 1 of IC3 which forms 1/1360 divider with IC2. The horizontal rate pulse obtained at pin 11 of IC2 is sent to pin 8 of phase detector IC4.

On the other hand, HD pulse from the Sync board is supplied to pin 7 of IC4 via pin 17 of CN2, IC5 (d) as a reference signal. The DC voltage which is corresponding to the phase error between HD and horizontal rate pulse and obtained at pin 3 of IC4 is fed to VCO through pins 2 and 1 of IC4 to make the phase (21MHz frequency) of oscillator by changing the capacitance of D6. This phase lock loop (PLL) circuit is stabilized, the 21MHz which is synchronized with the HD signal is generated.

8-2 1H Delay G Signal Generator Circuit

This circuit receives the G signal from the Process-2 board and generates 1H delayed G signal in order to make the detail signal.

The G signal from the Process-2 board is sent to amplifiers Q4~Q6 through pin 3 of CN1 and bypass switch SW1. The dynamic range of G signal is adjusted by VR3 (1H CCD D RANGE).

When the Auto White/Auto Black Set Switch is set to AWC position, the AWC busy signal from the Auto board is fed to pin 10 of analog switch IC6 through pin 18 of CN2 and non-amplified G signal is supplied to pin 2 of IC6.

The amplified G signal obtained at pin 15 of IC6 is sent through buffer Q7 to the low pass filter (LPF) CF1 in order to remove the noise. The G signal obtained at the output of LPF is fed through buffer Q54, amplifier Q53 and buffer Q8 to the clamp circuit Q9 where the G signal is clamped by H. CP pulse supplied to the base of Q9. The clamped G signal is sent to pin 12 of analog switch IC6 through buffers Q10 and Q11.

On the other hand, the HD pulse is fed through differentiator consisting of C9 and R10 to inverters IC5(f) and (e) to make the sync signal. The sync signal is then sent to the control terminal (pin 11) of analog switch IC6 and the sync signal is formed on the blanking period of the G signal. The sync level is controlled by VR4 (SYNC LEVEL).

The G signal with sync signal obtained at pin 14 of IC6 is supplied to pins 4 and 21 of 1H delay IC7 through buffer Q12.

The G signal is modulated by 21MHz carrier supplied to pin 14 of IC7 from pin 6 of IC5 and is then delayed 1H period.

The gain of the modulated signal is controlled by VR5 (1H V_{GG}-1) and VR6 (1H V_{GG}-2) control.

The modulated 1H delayed G signal obtained at pin 1 of IC7 is fed through buffer Q13 to 21MHz low pass filter (L.P.F) CF2 to remove the 21 MHz carrier component.

The 1H delayed G signal is then sent to the gain control circuit consisting of Q14, Q15, VR7 (1H OUTPUT GAIN-1) and VR8 (1H OUTPUT GAIN-2).

The 1H delayed G signal obtained at the collector of Q15 is supplied to the camp circuit consisting of Q17 where the 1H delayed G signal is clamped by H. CP pulse. The 1H delayed G signal is also fed to the 2H delay signal generator circuit.

The clamped 1H delayed G signal is sent to the black clip circuit consisting of Q18 ~ Q20 to remove the sync signal, and it is supplied to the aperture circuit and level dependent control circuit through buffer Q21.

8-3 2H Delay Signal Generator Circuit

This circuit receives 1H delayed G signal and generates 2H delayed G signal as in case of 1H delay signal generator circuit.

The 1H delayed G signal from the 1H delay signal generator circuit is sent to pin 13 of analog switch IC9 through amplifiers Q23~Q25. The dynamic range of 1H delayed G signal is adjusted by VR10 (2H CCD D. RANGE).

When the Auto White/Auto Black Set Switch is set to the AWC position, the AWC Busy signal from the Auto board is fed to pin 11 of analog switch IC9 and non-amplified 1H delay signal is supplied to pin 12 of IC9.

The amplified 1H delayed G signal obtained at pin 14 of IC6 is supplied to pins 4 and 21 of 1H delayed IC10 through capacitors C41 and C40 respectively.

The 1H delayed G signal is modulated by 21MHz carrier supplied to pin 14 of IC10 from pin 6 of IC5(c) and is then delayed 1H period more (total 2H). The gain of the modulated signal is controlled by VR11 (2H V_{GG}-1) and VR12 (2H V_{GG}-2).

The modulated 2H delayed G signal obtained at pin 1 of IC10 is fed through buffer Q26 to 21MHz low pass filter (L.P.F.) to remove the 21MHz carrier component.

The 2H delayed G signal is sent to the gain control circuit consisting of Q27, Q28, VR13 (2H OUTPUT GAIN-1) and VR14 (2H OUTPUT GAIN-2).

The 2H delayed G signal obtained at the collector of Q28 is supplied to the clamp circuit Q30 where the 2H delayed G signal is clamped by H. CP pulse. The clamped 2H delayed G signal is sent to the black clip circuit consisting of Q31 ~ Q33 to remove the sync signal, and it is supplied to the aperture signal generator circuit.

8-4 Aperture Signal Generator Circuit

This circuit generates V. aperture signal for enhancing the V resolution by mixing of non-delayed G signal (0H) , 1H delayed G signal (1H) and 2H delayed G signal (2H) and generates H. aperture signal to enhance the H resolution.

- **V Aperture Signal Generator Circuit**

The non-delayed G signal is supplied to the emitter of amplifier Q35 through pin 3 of CN1, bypass switch SW1 and R153. On the other hand, the 2H delayed G signal is fed to the emitter of Q35 through R152. They are mixed at the emitter of Q35. The mixed G signal is then sent through amplifier Q35 and buffer Q36 to the emitter of amplifier Q37 where it is mixed with the 1H delayed G signal supplied to the base of Q37. As a result, V aperture signal is obtained at the collector of Q37.

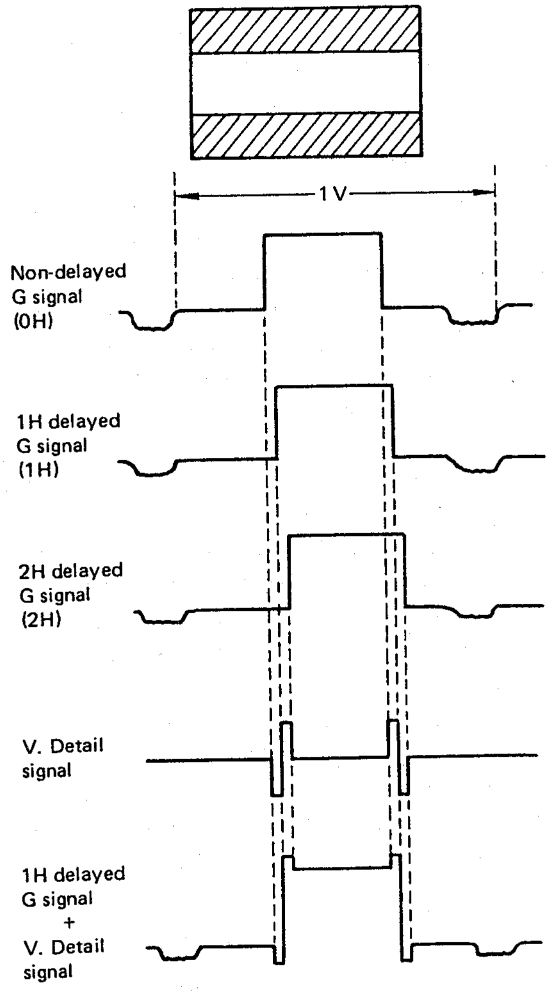

1 V
Non-delayed G signal (0H)
1H delayed G signal (1H)
2H delayed G signal (2H)
V. Detail signal
1H delayed G signal + V. Detail signal

Fig. 8-1 V. Detail Signal Generator Circuit

VR18 (V. APERTURE BAL) is a control for minimizing the video signal and obtaining only the V. aperture signal.

The V. aperture signal obtained at the collector of Q37 is fed to low pass filter (L.P.F.) consisting of C61, C62 and L10 to limit the frequency response of V aperture signal and remove the noise.

The V. aperture signal from the low pass filter (L.P.F) is supplied to the level dependent control circuit through VR19 (V.APERTURE GAIN) and buffer Q38.

VR19 (V. APERTURE GAIN) is a control for the V. aperture signal level.

- **H.Aperture Signal Generator Circuit**

This circuit generates H. detail signal to enhance the H resolution.

The R signal from pin 4 of CN1, B signal from pin 2 of CN1, non-delayed G signal from pin 3 of CN1 and 1H delayed G signal from Q21 are mixed at the base of Q39 to consist a comb filter.

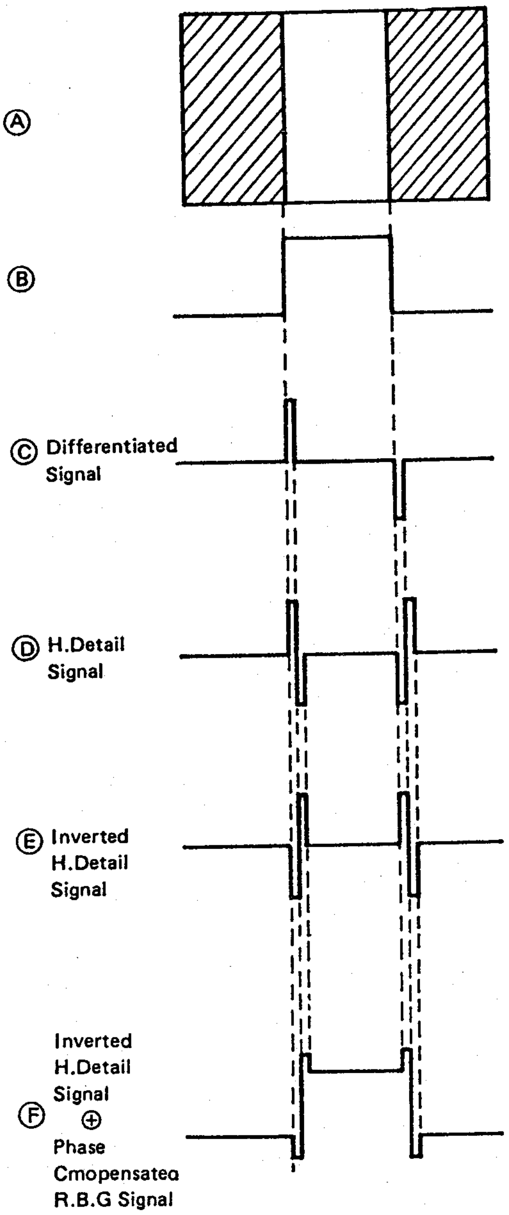

Ⓐ
Ⓑ
Ⓒ Differentiated Signal
Ⓓ H.Detail Signal
Ⓔ Inverted H.Detail Signal
Ⓕ Inverted H.Detail Signal ⊕ Phase Cmopensateo R.B.G Signal

Fig. 8-2 H. Detail Signal

The comb filter removes 3.58MHz subcarrier and its harmonics to reduce the cross-color noise. When the camera is aimed at an object (A) for example, the mixed signal (B) is obtained at the emitter of Q39, This signal is differentiated by L11 and C66 thus pulse (C) appeared. This pulse is differentiated again by L12 and C68 and as a result, H. detail signal (D) is generated.

The H. detail signal is then supplied through inverter Q41 and buffer Q42 to the level dependent control circuit.

8-5 Level Dependent Control Circuit

This circuit generates the detail signal corresponding to the G signal and sends to the detail signal output circuit.

The 1H delay G signal from the emitter of Q21 is supplied to level dependent circuit consisting of Q45 and Q46. When the 1H delay G signal becomes below the specified level set by VR23 (LEVEL DEPENDENT), Q45 is turned ON and no signal is sent to the H and V aperture mix circuit consisting of Q47 and IC11.

By this way, the detail signal in dark picture areas is removed. In addition, while H. blanking period, composite preblanking pulse is supplied to the base of Q45, thus, Q46 OFF and Q45 ON, therefore, the noise during the blanking period is removed.

When the High Gain Selection Switch on the side of the camera is set to the +18dB (Gain-2) position, Q44 is turned ON and the specified level is set by VR24 (GAIN-2 LEVEL DEPENDENT).

The detail ON/OFF Switch on the side of the camera or Detail board is set to OFF position, the low level is supplied to the base of Q43 for turning it ON. As a result, no signal is supplied to the H and V aperture mix circuit.

The V. aperture signal from Q38 and H. aperture signal from Q42 is sent to the drain and source of Q47 respectively and they are mixed at amplifier IC11.

The detail signal obtained at pin 5 of IC11 is fed to the detail output circuit.

8-6 Detail Signal Output circuit

This circuit receives the horizontal (H) and vertical (V) aperture signal, mixes them and sends the mixed detail signal to the red (R), green (G) and blue (B) signal processing circuit in the Process-2 board.

The detail signal is fed to the noise coring circuit to minimize noise on the detail signal.

The detail signal (A) which contains the noise is fed to D3 and D4. The center (noise) portion of the detail signal is suppressed by threshold level of D3 and D4 (B).

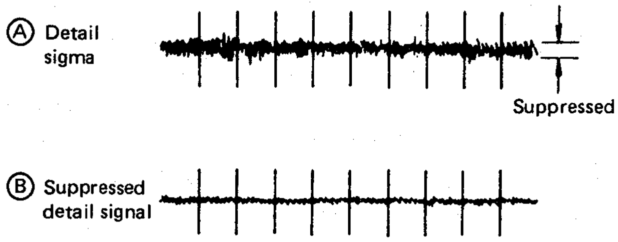


Fig. 8-3 Noise Suppression

When the High Gain Selection Switch on the Side Switch board is set to 0dB position, potential at gate of Q49 and Q50 is low level turning them OFF and the noise suppress level at 0dB position is controlled by VR27 (NOISE SUPPRESS).

When the High Gain Selection Switch is set to +9dB (Gain-1) position, the low (L) level is supplied to the control terminal (pin 9) of analog switch IC12 and pins 5 and 4 of IC12 are connected. As a result, +4.5V DC which is generated by IC8(b) is sent to the gate of Q50 to turn it ON. Therefore VR26 (GAIN-1 NOISE SUPPRESS) is parallelly connected to VR27 and the noise suppress level at +9dB position is finely adjusted by VR26.

When the High Gain Selection Switch is set to +18dB position, the low (L) level is fed to the control terminal (pin 10) of IC12 through pin 8 of CN1 and D5, and pins 2 and 15 are connected. As a result, +4.5V DC is sent to the gate of Q49 and it is turned ON. Therefore VR25 (GAIN-2 NOISE SUPPRESS) is parallelly connected to VR27 and the noise suppress level at +18dB is adjusted by VR25.

The noise suppressed detail signal is then supplied to VR28 (TOTAL APERTURE) through C81. When the Detail Level Selection Switch on the Shading board is set to DTL HIGH position, the low (L) level is fed to the control terminal (pin 11) of analog switch IC12 and pins 12 and 14 of IC12 are connected. On the other hand, the Detail Level Selection Switch is set to DTL Low position, the high (H) level is sent to the control terminal (pin 11) of IC12 through pin 5 of CN1 and pins 13 and 14 of IC12 are connected. As a result, the detail gain is controlled by the position of the Detail Level Selection Switch.

The detail signal obtained at pin 14 of IC12 is fed to the Process-2 board through buffer Q51 and pin 14 of CN2.

9. Auto Board

9-1. Auto Black Control (ABC)/Auto Pulse Cancel (APC) Circuit
9-2. Auto White Control (AWC) Circuit
9-3. Character Display Circuit

9-1 Auto Black Control (ABC)/Auto Pulse Cancel (APC) Circuit

This circuit automatically sets the pedestal levels of the red (R) and the blue (B) image to match with the pedestal level of the green (G) image by utilizing the analog switches, comparator and microprocessor which instructs the change of the pedestal level for the red (R) and the blue (B) images.

When the pedestal levels of R signal and B signal become same as the pedestal level of G signal, the black balance setting is completed and the microprocessor memorizes the black balance for long period of the time until next black balance setting.

When the Auto White/Auto Black Set Switch on the front of camera is pressed down to ABC position for the automatic black balance setting, the iris of the power servo control zoom lens is automatically closed for blocking the incoming light and the black balance is set automatically in approximately 5 seconds. After completing the black balance setting, the lens iris is automatically returned to the previous position.

If the black balance must be set in the manual iris control mode, the incoming light should be blocked by closing the lens iris manually, setting the filter wheel of the camera to No. 4 (CLOSE) or capping the lens.

The ABC start pulse is fed to pin 5 of IC4 from pin 27 of CN1 on this board as starting trigger of the auto black control circuit.

The B, G, R signals are fed from pin 11/13/15 of CN1 to buffer Q20/Q23/Q17 respectively and they are clamped by Q22/Q25/Q29 respectively. The clamp level is set to 2.0V. The fine adjustment of the clamp level for R and B signal are taken by VR2 (R ABC) for R signal and VR4 (B ABC) for B signal and they are adjusted to match with G signal. The analog switch IC8 is controlled by AWC busy pulse which is low (L) level when the auto black control is set being so that the analog switcher IC8 is set to L position for the auto black control.

The R signal is fed to pin 3 of analog switch IC8 and the B signal is fed to pin 5 of IC8. The analog switch connected between pins 3, 4 and 5 of IC8 is controlled by R/B selection pulse supplied to pin 9 of IC8 from pin 49 of microprocessor IC1 so that the R signal is selected when the R/B selection pulse at pin 9 of IC8 becomes high (H) and the B signal is selected when the R/B selection pulse at pin 9 of IC8 becomes low (L).

The R or B signal is then sent to pin 3 of analog switch IC9 where the center of R or B signal is gated by the center gate pulse supplied to pin 9 of IC9 from pin 15 of IC9.

The clamp pulse (CP) (A) from pin 34 of CN3 is fed to the monostable multivibrator IC11 (a) and the pulse (B) is made. The pulse (B) is supplied to other monostable multivibrator IC11 (b) and the center gate pulse (C) is made.

The center gate pulse (C) is sent to the control terminal (pin 9) of IC9 through pin 2 of IC9 since the control terminal (pin 10) of IC9 is always low (L) Level.

The gated R or B signal obtained at pin 4 of IC9 is fed through buffer Q26 to pin 3 of analog switch IC10 for ABC/APC and the base of Q28 for AWC.

On the other hand, the G signal is sent to pin 13 of analog switch IC9 and the center portion of G signal is gated by the center gate pulse (C) as in the case of R and B signal.

The gated G signal is supplied through buffer Q27 to pin 5 of analog switch IC10 for ABC/APC and the base of buffer Q29 for AWC.

The G signal at pin 5 of IC10 and R or B signal at pin 3 of IC10 is selected by the R, B or G signal selection pulse supplied to the control terminal (pin 9) of IC10 from pin 50 of microprocessor IC1, and the R, B or G signal is obtained at pin 4 of IC10.

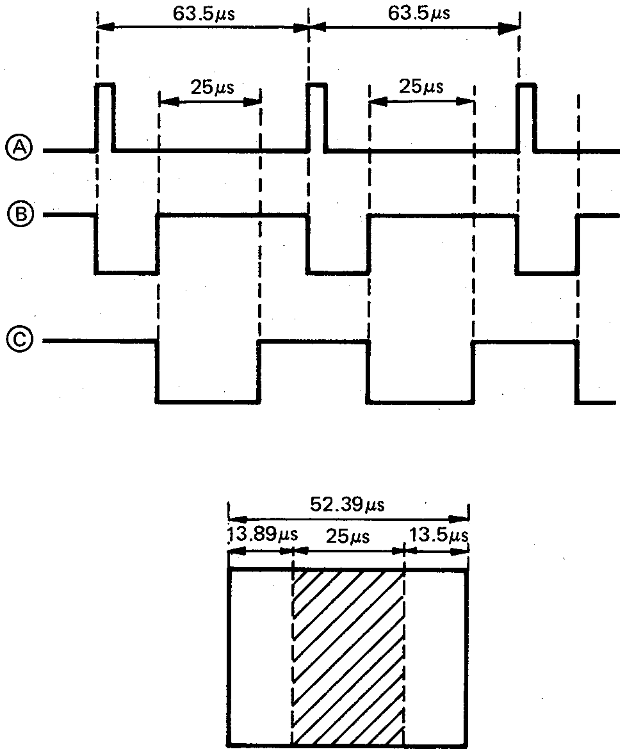


Fig. 9-1 Center Gate Pulse

o **Auto Black Control (ABC) Function.**

(1) When the control terminal (pin 11) of IC10 is set to high (H) position, the G signal is obtained at pin 13 of IC10 and it is sent to the integrator consisting of R86 and C32 in order to convert it to DC level. The DC level of G signal is then supplied to pin 3 of comparator IC14 (a).

(2) When the control terminal (pin 11) of IC10 is set to low (L) position, the R or B signal is obtained at pin 12 of IC10 and it is sent to the integrator consisting of R87 and C31 in order to convert it to DC level. The DC level of R or B signal is then supplied to pin 2 of IC14 (a).

(3) As a result, the DC error between G and R or B signal is detected at pin 1 of IC14 (a) and it is sent to pin 54 of microprocessor IC1 through pins 2 and 15 of IC10 when pin 48 of microprocessor IC1 sends low (L) level to control terminal (pin 10) of IC10.

If the DC level of B or R signal is higher than DC level of G signal, the output of the comparator IC14 (a) shows high (H) so that the microprocessor IC1 instructs the count down 8-bit digital code to D/A converter Z1 and analog level at pin 10 of Z1 is fed to buffer IC15 (a).

The analog level of pin 1 of IC15 (a) is supplied to pin 3 of analog switch IC18 of which switch position is selected by the signal at pins 9, 10 and 11 of IC18. The selected DC level at pin 15 of IC18 is fed to pin 5 of buffer IC16 (b) for R pedestal setting DC level and pin 12 of IC18 is fed to pin 3 of buffer IC16 (a) for B pedestal setting DC level respectively.

The signal at IC18 are controlled by inhibit signal supplied to pin 6 of IC18 through inverter Q6.

The analog level for count down is fed to IC16 (b) for reducing R pedestal level or fed to IC16 (a) for reducing B pedestal level until DC level of R-G and B-G signal becomes minimum.

If the DC level of B or R signal is lower than DC level of G signal, the output of comparator IC14 (a) shows low (L) so that the microprocessor IC1 instructs the 8-bit count up digital code to D/A converter Z1 and the analog level at pin 10 of Z1 is fed to IC15 (a).

The analog level for count up is fed to IC16 (b) for increasing R pedestal level or fed to IC16 (a) for increasing B pedestal level of R-G and B-G and signal becomes minimum.

As a result, the B and R pedestal level match the G pedestal level automatically and the black balance setting is accomplished.

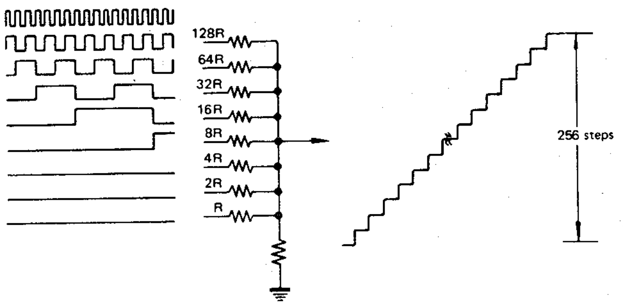

128R
64R
32R
16R
8R
4R
2R
R
256 steps

Fig. 9-2 D / A Converter Z1

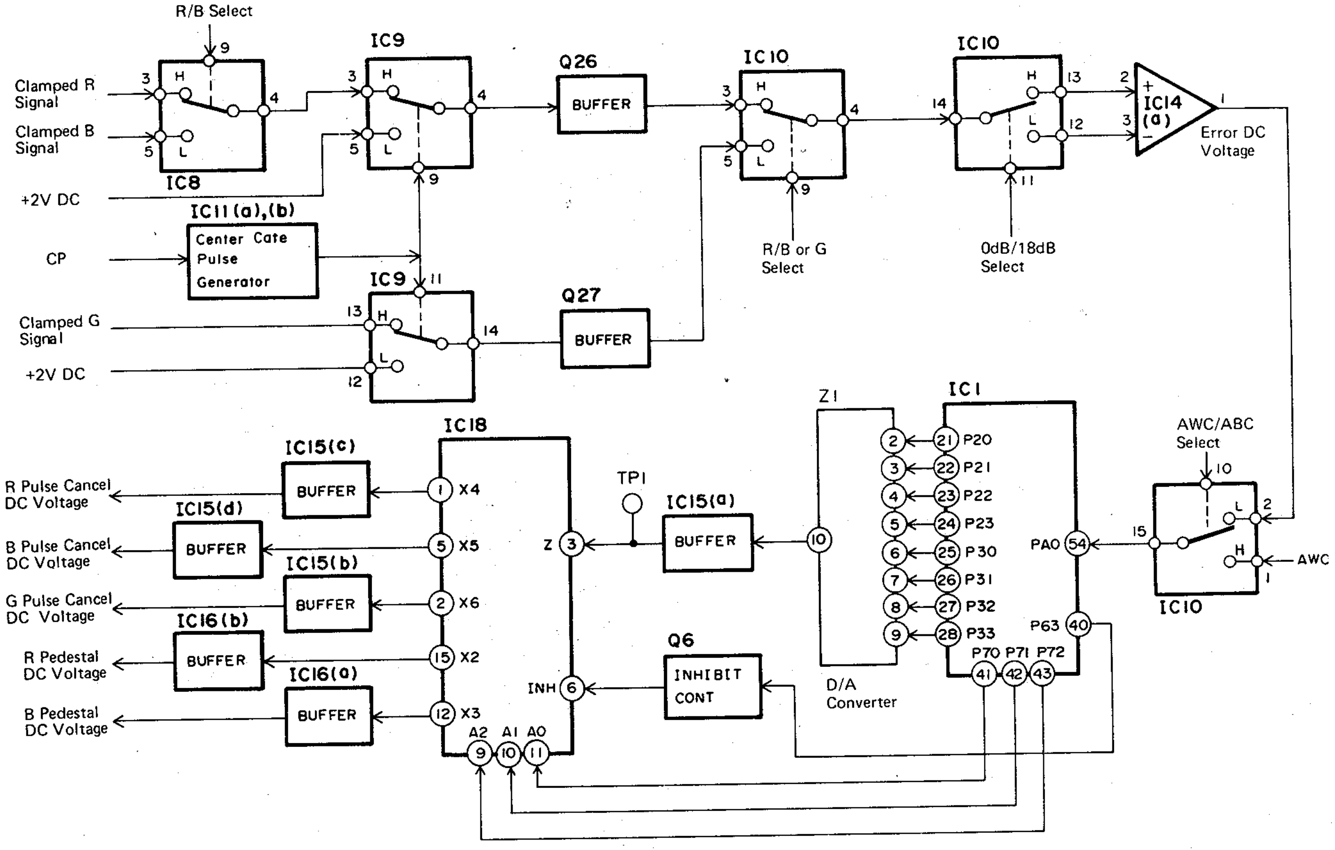

R/B Select
Clamped R Signal
Clamped B Signal
IC8
+2V DC
IC11 (a),(b)
Center Cate Pulse Generator
CP
IC9
IC9
Clamped G Signal
+2V DC
Q26
BUFFER
Q27
BUFFER
IC10
R/B or G Select
IC10
0dB/18dB Select
IC14 (a)
Error DC Voltage
Z1
D/A Converter
IC1
P20
P21
P22
P23
P30
P31
P32
P33
PA0
P63
P70 P71 P72
AWC/ABC Select
AWC
IC10
IC18
X4
X5
X6
X2
X3
Z
INH
A2 A1 A0
TP1
IC15(a)
BUFFER
Q6
INHIBIT CONT
IC15(c)
BUFFER
IC15(d)
BUFFER
IC15(b)
BUFFER
IC16(b)
BUFFER
IC16(a)
BUFFER
R Pulse Cancel DC Voltage
B Pulse Cancel DC Voltage
G Pulse Cancel DC Voltage
R Pedestal DC Voltage
B Pedestal DC Voltage

Fig. 9-3 ABC/APC Control Circuit

o **Auto pulse cancel (APC) Function.**

This circuit automatically makes the pedestal levels of the red (R), green (G) and blue (B) image at +18dB position of the high gain selection switch to match with that in the 0dB position by utilizing the analog switches, comparator and microprocessor which instructs the change of pedestal level for the red (R), green (G) and the blue (B) images.

When the pedestal levels of R, G and B signal at +18dB position become same as that in the 0dB position, the blanking offset is set and the microprocessor memorizes the blanking offset for long period of the time until the next automatic black balance is set.

This function is worked when the automatic black balance is set. Refer to the Auto Black Control (ABC) Function for the detail.

The black level at +18dB and that in the 0dB position are supplied to microprocessor IC1 through the same rout of automatic black control circuit and compared in IC14 (a).

IC14(a) then instructs the 8-bit digital code to D/A converter Z1 and the analog level at pin 10 of Z1 is fed fed to buffer IC15 (a).

The analog level at pin 1 of IC15 (a) is supplied to pin 3 of IC18 and fed to IC15 (b) for G pulse cancel, IC15 (c) for R pulse cancel and IC15 (d) for B pulse cancel respectively.

As a result, the R, G and B pedestal level at +18dB position match with that in the 0dB position automatically and the pulse cancel (blanking offset) control is accomplished together with the auto black control circuit.

9-2 AWC Circuit

This circuit is automatically sets the peak/white level of the red (R) and blue (B) image for matching them with the peak/white level of the green (G) image by utilizing the analog switches, comparator and microprocessor which instructs the change of the red (R) gain and the blue (B) gain.

When the R signal and B signal levels becomes same as the G signal level, the white balance is completed and the microprocessor memorizes the white balance for long period of time until next white balance is set.

When the Auto White/Auto Black Set Switch on the front of the camera is pressed up to AWC position for the automatic white balance setting while aiming the camera at a white object, the positive AWC start pulse is sent to pin 7 of IC4 through the front switch board, pin 3 of CN7 on the mother board and pin 26 of CN2 on the Auto board to trigger the auto white control circuit.

The B, G, R signals are fed to buffer Q20/Q23/Q17 from pin 11/13/15 of CN1 respectively and are clamped by Q22/Q25/Q19 respectively.

The clamp level is set to 2.0V.

The fine adjustment of the clamp level for R and B signal are taken by VR1 (R AWC) for R signal and VR3 (B AWC) for B signal and they are adjusted to match with G signal.

The analog switch IC8 is controlled by AWC pulse which is high (H) level when the auto white control is being set so that the analog switch IC8 is set to H position for the auto white control.

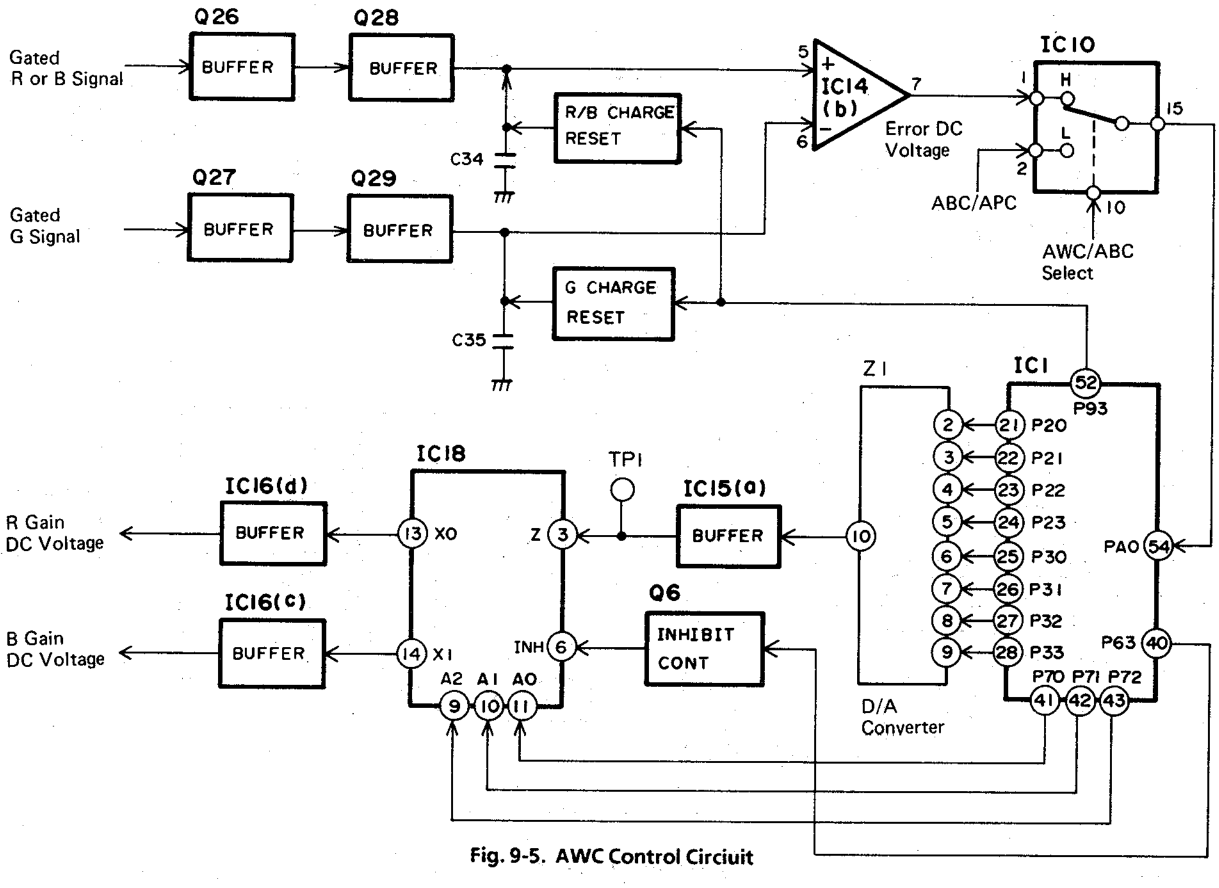

Q26
Q28
Gated R or B Signal
BUFFER
BUFFER
R/B CHARGE RESET
C34
Q27
Q29
Gated G Signal
BUFFER
BUFFER
G CHARGE RESET
C35
IC14 (b)
5
6
7
Error DC Voltage
IC10
H
L
1
2
15
10
ABC/APC
AWC/ABC Select
Z1
IC1
52
P93
2 21 P20
3 22 P21
4 23 P22
5 24 P23
6 25 P30
7 26 P31
8 27 P32
9 28 P33
PA0 54
P63 40
P70 P71 P72
41 42 43
D/A Converter
IC18
TP1
IC15(a)
BUFFER
10
IC16(d)
R Gain DC Voltage
BUFFER
13 X0
Z 3
IC16(c)
B Gain DC Voltage
BUFFER
14 X1
INH 6
A2 A1 A0
9 10 11
Q6
INHIBIT CONT

Fig. 9-5. AWC Control Circuit

The R or B signal at pin 4 of IC8 and G signal at the collector of Q25 are sent to pins 3 and 13 of IC9 respectively.

The R or B and G signal gated by the center gate pulse which is supplied to pins 9 and 11 of IC9 are obtained at pins 4 and 14 of IC9 respectively as in the case of the auto black control circuit.

The G signal obtained at pin 14 of IC9 is sent through buffers Q27 and Q29 to the integrator consisting of R91 and C35, and converted to the DC level.

The R or B signal obtained at pin 4 of IC9 is sent to the integrator consisting of R88 and C34 through buffers Q26 and Q28 and converted to the DC level. The DC levels of R or B signal and G signal are fed to pins 5 and 6 of comparator IC14(b) respectively. The transistors Q31 and Q30 discharge capacitors C35 and C34 to be integrator and is controlled by the reset pulse from pin 52 of microprocessor IC1.

When the AWC/ABC switch is set to AWC position, the control terminal (pin 10) of IC10 becomes high (H) level and the DC error obtained at pin 7 of IC14 (b) is sent to pin 54 of IC1 through pins 1 and 15 of IC10.

If the B signal is higher than G signal, the output of IC14 (b) is high (H) and the microprocessor IC1 instructs the count down digital code to D/A converter Z1 for reducing the blue (B) gain in the Process-1 board through buffer IC16 (C) and analog switcher IC18. If the B signal is lower than G signal, the output of IC14 (b) is low (L) and microprocessor IC1 instructs the count up digital code to D/A converter Z1 for increasing the blue (B) gain in the Process-1 board. The red (R) gain in the process-1 board is also controlled as in the similar way. The adjustment for blue (B) and red (R) gain are alternately carried.

The microprocessor IC1 sends 8-bit digital code to D/A Converter Z1 for converting to analog DC level which is fed to pin 3 of IC15 (a) from pin 10 of Z1. The analog DC level at pin 1 of IC15 (a) is supplied to pin 3 of analog switch IC18 of which switch is positioned by the pulse signals at pins 9/10/11 of IC18.

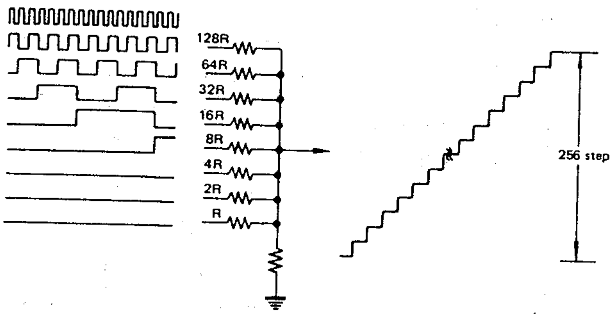


Fig. 9-4 D / A Converter Z1

The pulse signals at pins 11/10/9 of IC18 are provided from the pins 41/42/43 of microprocessor IC1 respectively.

The flow of the analog DC level in IC18 is controlled by the inhibit signal at pin 6 of IC18. The inhibit signal for IC18 is provided from pin 40 of IC1.

The analog DC level for the B signal is fed to pin 10 of buffer IC16 (c) from pin 14 of IC18 and is sent to the Process-1 board through the Mother board.

The analog DC level for R signal is fed to pin 12 of buffer IC16 (d) from pin 13 of IC18 and is sent to the Process-1 board through the Mother board.

These procedure is continued until the color different signal B-G and R-G at IC14 (b) becomes minimum.

As a result, the B and R signal level match the G signal level automatically and the white balance setting is accomplished.

9-3 Character Display Circuit

The microprocessor IC1 generates the programmed key scan pulse signals from the output ports of IC1 and receives these signals at the input ports of IC1 through the input interface circuits.

According to the input signals, the microprocessor IC1 supplies the instruction signals to the character generator IC3.

The character generator IC3 receives the instruction signals and supplies to the encoder board in order to mix with video signal.

o **Microprocessor and Input Matrix Circuit**

The pin identifications and functions of the microprocessor IC1 (MN1758CVW2) is described in the Table 9-1.

Pin No.	Name	In/Out	Descriptions
1	PC3/SB0A	Out	Character Data Output
2	RST	In	Reset Input
3	Sync	-	Not Used
4	X2	-	Not Used
5	X1/TCIA	In	Not Used (DC Power Input)
6	V_{SS}	-	Ground
7	OSC 2	Out	Clock Pulse Generator (8MHz)
8	OSC 1	In	Clock Pulse Generator (8MHz)
9	V_{DD}	In	DC Power Input
10	TCIB	-	Not Used
11	IRQ0	In	Power off Detect
12	IRQ1	In	Not Used (Ground)
13	P00	Out	Camera Battery Warning Output
14	P01	-	Not Used
15	P02	-	Not Used

16	P03	-	Not Used
17	P10	-	Not Used
18	P11	-	Not Used
19	P12	-	Not Used
20	P13	-	Not Used
21	P20	Out	R/B PED, R/B GAIN, R/G/B PUL CAN (LSB) Output
22	P21	Out	R/B PED, R/B GAIN, R/G/B PUL CAN Output
23	P22	Out	R/B PED, R/B GAIN, R/G/B PUL CAN Output
24	P23	Out	Key Scanning Pulse Output R/B PED, R/B GAIN, R/G/B PUL CAN
25	P30	Out	Key Scanning Pulse Output R/B PED, R/B GAIN, R/G/B PUL CAN Output
26	P31	Out	Key Scanning Pulse Output R/B PED, R/B GAIN, R/G/B PUL CAN Output
27	P32	Out	Key Scanning Pulse Output R/B PED, R/B GAIN, R/G/B PUL CAN Output
28	P33	Out	R/B PED, R/B GAIN, R/G/B PUL CAN (MSB) Output
29	P40	In	Key Scanning Pulse Input
30	P41	In	Key Scanning Pulse Input
31	P42	In	Key Scanning Pulse Input
32	P43	In	Key Scanning Pulse Input
33	P50	In	Key Scanning Pulse Input
34	P51	In	Key Scanning Pulse Input
35	P52	In	Key Scanning Pulse Input
36	P53	In	Key Scanning Pulse Input
37	P60	-	Not Used
38	P61	Out	Character Data Strobe Output
39	P62	-	Not Used
40	P63	Out	Data Latch Inhibit Output
41	P70	Out	D/A Converter Control Output for IC18/IC19 of "A0"
42	P71	Out	D/A Converter Control Output for IC18/IC19 of "A1"
43	P72	Out	D/A Converter Control Output for IC18/IC19 of "A2"
44	P73	Out	Auto Indicator Output
45	P80	Out	ABC Busy Output
46	P81	Out	APC Busy Output
47	P82	-	Not Used
48	P83	Out	AWC Busy Output
49	P90	Out	R/B Signal Selection Output
50	P91	Out	R, B, G Signal Selection Output
51	P92	Out	0dB/+18dB Selection Output
52	P93	Out	APC Gain up/G Charge Reset Output
53	EXPS	-	Not Used
54	PA0	In	AWC/ABC Level Input
55	PA1	In	A/D Level Input
56	PA2	In	Peak Detect Warning Input
57	PA3	In	ULI Detect Input
58	PB0	In	Vertical Drive Pulse Input
59	PB1	-	Not Used
60	PB2/SBTB	-	Not Used
61	PB3/SBIB	-	Not Used
62	PC0/SB0B	-	Not Used
63	PC1/SBTA	Out	Character Data Clock Output
64	PC2/SBIA	-	Not Used

Table 9-1 Pin Identification of IC1 (MN1758)

The programmed signals (Key scan pulse) are supplied to output ports P23, P30 ,P31 and P32 through transistors and switches.

Then these programmed signals are supplied to Input interface circuit from input ports P40, P41, P42, P43, P50, P51, P52 and P53. (Refer to Fig.9-4 Input Matrix circuit.)

According to the programmed signals at output ports P23, P30, P31 and P32, and the signals at input ports P40, P41, P42, P43, P50, P51, P52 and P53, the microprocessor identifies the instruction with the signal flow route at input interface circuit and supplies the instruction signals to character generator IC3.

o Character Generator Circuit

The clock pulse frequency of IC3 is adjusted by CT1 (CHARACTER POSITION).

The display characters obtained at pin 11 of IC3 are mixed with negative V. blanking pulse fed from pin 10 of IC3 through amplifier Q4.

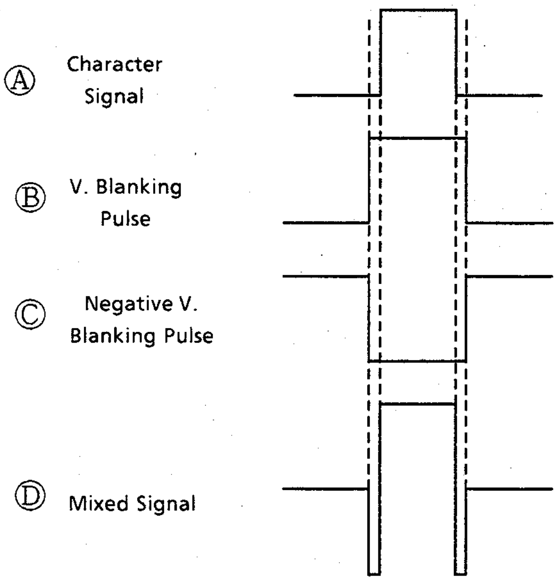


Fig. 9-6 Character Edge Circuit

The display characters obtained at the base of Q5 are sent to the electronic viewfinder through pin 31 of CN3 on this board, Mother board and Encoder board.

The Pin Identification of character generator IC3 (UPD6142G-101) as follows;

Pin No.	Name	In/Out	Descriptions
1	DATA	In	Serial Data Input
2	CLK	In	Clock Pulse Input
3	STB	In	Strove Input
4	CS	In	Chip Select Input
5	V_{DD}	In	+5.1V Power Input
6	OSC_{Out}	Out	Oscillator Output
7	OSC_{In}	In	Oscillator Input
8	V_{SS}	–	Ground
9	V_R	Out	Not Used
10	VBLK	Out	Vertical Blanking Pulse Output
11	V_G	Out	Character Output (Green)
12	V_B	Out	Not Used
13	VS	In	Vertical Start Pulse Input
14	HS	In	Horizontal Start Pulse Input
15	CK	Out	Not Used
16	$TEST_{In}$	In	Not Used (Ground)

Table 9-2 Pin Identification of IC3 (UPD6142G-101)

o Power Select Circuit

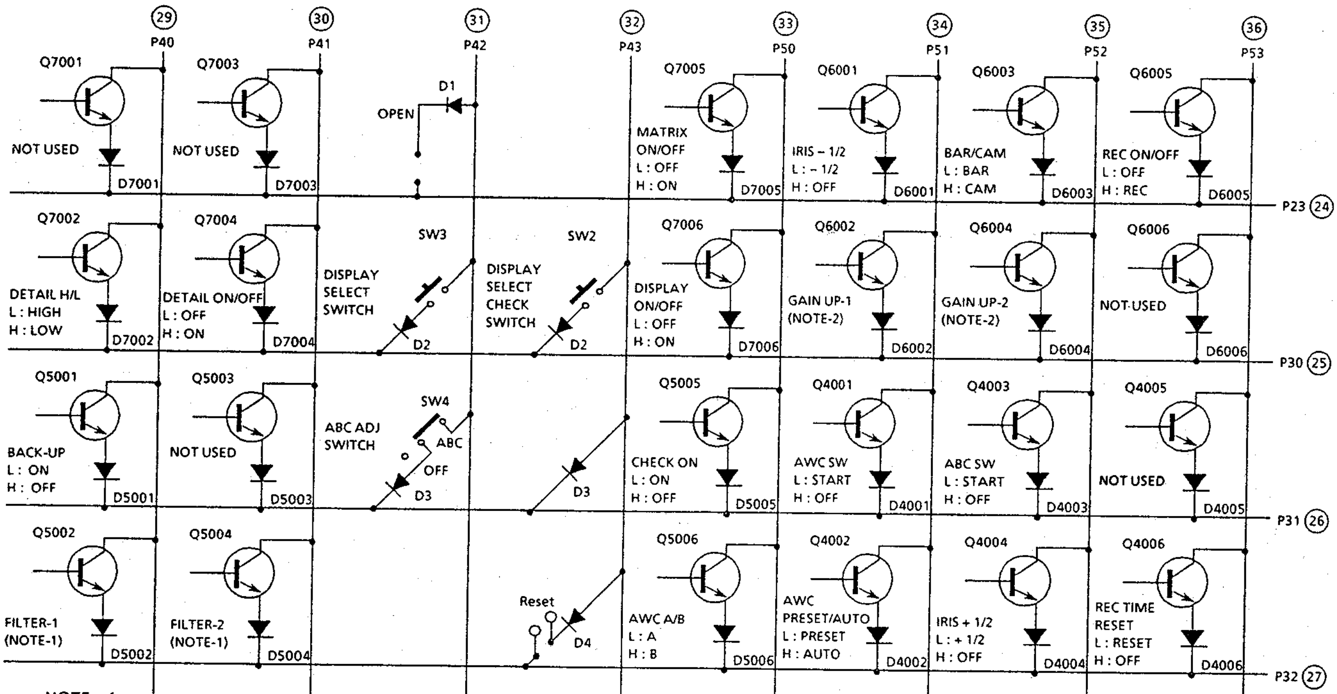
The power select circuit consisting of Q1, Q2, D5 and BAT1 selects DC power supplied to microprocessor IC1.
When the camera is turned ON, +5.1V DC power is supplied to pin 9 of IC1 through the constant current circuit consisting of Q1 and Q2. However, when the camera is turned OFF, Diode D5 is turned ON and DC power from back-up battery BAT1 is supplied to pin 9 of IC1. On the other hand, the DC power of back-up battery BAT1 is fed to pin 5 of comparator IC17 (b). When the DC level at pin 5 of IC17 (b) becomes less than +2.8V, the control signal is sent from pin 7 of IC17 (b) to pin 7 of IC5 and the microprocessor indicates the back-up battery warning signal on the electronic viewfinder.

o Other Character Indication Circuit

The analog switch IC19 receives following analog signals and sends them to the microprocessor IC1.

o	Pin 13 ···	Audio Signal Level Indication
o	Pin 15 ···	Iris F Position Indication
o	Pin 12 ···	Camera DC Power Indication
o	Pin 1 ···	Battery Warning Indication

The analog for above indication signals obtained at pin 3 of IC19 is fed to pin 5 of comparator IC20. On the other hand, the reference voltage is supplied to pin 6 of comparator IC20 from +2.5V regulator IC15 (a).



㉙ P40
㉚ P41
㉛ P42
㉜ P43
㉝ P50
㉞ P51
㉟ P52
㊱ P53
Q7001
NOT USED
D7001
Q7003
NOT USED
D7003
D1
OPEN
Q7005
MATRIX ON/OFF
L : OFF
H : ON
D7005
Q6001
IRIS – 1/2
L : – 1/2
H : OFF
D6001
Q6003
BAR/CAM
L : BAR
H : CAM
D6003
Q6005
REC ON/OFF
L : OFF
H : REC
D6005
P23 ㉔
Q7002
DETAIL H/L
L : HIGH
H : LOW
D7002
Q7004
DETAIL ON/OFF
L : OFF
H : ON
D7004
SW3
DISPLAY SELECT SWITCH
D2
SW2
DISPLAY SELECT CHECK SWITCH
D2
Q7006
DISPLAY ON/OFF
L : OFF
H : ON
D7006
Q6002
GAIN UP-1
(NOTE-2)
D6002
Q6004
GAIN UP-2
(NOTE-2)
D6004
Q6006
NOT USED
D6006
P30 ㉕
Q5001
BACK-UP
L : ON
H : OFF
D5001
Q5003
NOT USED
D5003
SW4
ABC ADJ SWITCH
ABC
OFF
D3
D3
Q5005
CHECK ON
L : ON
H : OFF
D5005
Q4001
AWC SW
L : START
H : OFF
D4001
Q4003
ABC SW
L : START
H : OFF
D4003
Q4005
NOT USED
D4005
P31 ㉖
Q5002
FILTER-1
(NOTE-1)
D5002
Q5004
FILTER-2
(NOTE-1)
D5004
Reset
D4
Q5006
AWC A/B
L : A
H : B
D5006
Q4002
AWC PRESET/AUTO
L : PRESET
H : AUTO
D4002
Q4004
IRIS + 1/2
L : + 1/2
H : OFF
D4004
Q4006
REC TIME RESET
L : RESET
H : OFF
D4006
P32 ㉗

NOTE – 1

	FILTER NO-1	FILTER NO-2	FILTER NO-3	FILTER NO-4
FILTER-1	L	H	L	H
FILTER-2	L	L	H	H
DISPLAY	FLT1 3.2K	FLT2 5.6K+ND	FLT3 5.6K	FLT4 CLOSE

NOTE – 2

	0dB	9dB	18dB
GAIN UP-1	L	H	X
GAIN UP-2	L	L	H
DISPLAY	0dB	9dB	18dB

Fig. 9-7 Input Matrix Circuit

As a result, error DC level between the reference signal and the analog signal is obtained at pin 7 of IC20 and it is fed to pin 55 of microprocessor IC1 in order to display the characters on the electronic viewfinder.

The audio signal (A) is sent to the cross point of R98 and R99 through C36. On the other hand, approximately +1.2V DC produced by IC17(a) with R103 and R104 is added to the audio signal through R98, and signal (B) thus obtained is supplied to pin 13 of peak detector IC17(c). It is then compared with +1.2V DC supplied to pin 12 of IC17(c) from cross point of R103 and R104 and signal (C) is detected. The signal (C) is supplied to the rectifier D7 and integrator consisting of R101 and C38, and signal (D) is obtained.

The signal (D) thus made is sent to the pin 13 of IC19 as peak level of audio signal.

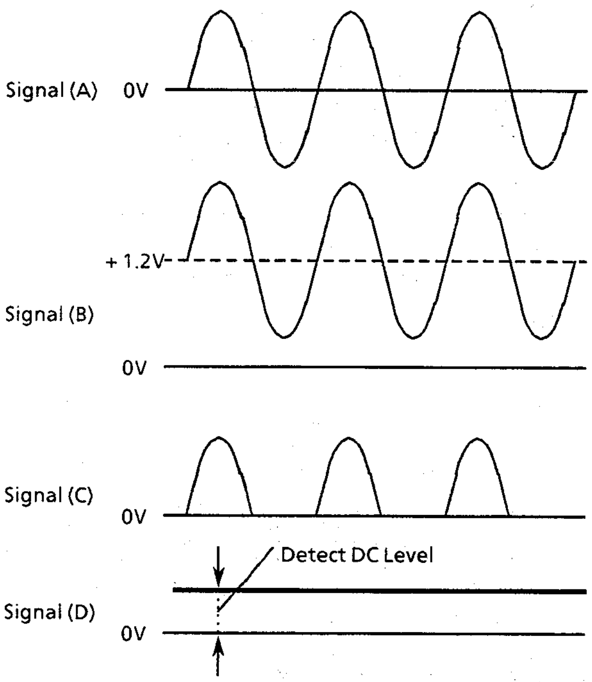


Fig. 9-7 Audio Peak Level Detect

The iris F number position detect signal is fed to pin 15 of IC19 through pin 33 of CN3 and integrator R105 and C43 in order to display the characters for iris F number position.

The +12V DC voltage from pin 20 of CN2 is supplied to pin 12 of IC19 through ripple filter consisting of R113, R114 and C41, and is displayed on the electronic viewfinder.

When the +12V DC voltage of the battery from pin 20 of CN2 becomes less than +10.6V, the battery warning indicator lights on the electronic viewfinder. VR7 (BATT WAR ADJ) is a control for setting the warning voltage.

10. Power Board

10-1 +9.2V Regulator Circuit
10-2 +5.1V Regulator Circuit
10-3 +20.9V Regulator Circuit
10-4 −8V Regulator Circuit
10-5 −4.8V Regulator Circuit
10-6 Standby control Circuit
10-7 Protection Circuit

10-1 +9.2V Regulator Circuit

This circuit consisting of IC1 (d), IC2(b), transistors Q2 to Q4 generates regulated +9.2V DC power.

Unregulated +12V DC power is supplied to the source of switching FET Q4 through R1 and L1.

The HD pulse is supplied from pin 7 of CN1 to pin 5 of sawtooth generator IC1 (b). The sawtooth pulse obtained at pin 2 of IC1 (b) is fed to pin 11 of standby control IC1(d).The switching pulse obtained at pin 13 of IC1 (d) is sent to the gate of switching FET Q4 through Q2 and Q3.

The regulated +9.2V DC power is obtained at TP1 (+9.2V) and supplied to other boards.

The voltage variation of +9.2V DC is detected by VR1 (+9.2V ADJ) and fed to pin 6 of comparator IC2(b). On the other hand, regulated +4.7V DC bias generated by IC2(a) is fed to pin 5 of IC2 (b). The comparated output is obtained at pin 7 of IC2 (b) and fed to pin 10 of IC1(d) controls pulse width at pin 13 of IC1 (d) so that +9.2V DC is kept constant.

10-2 +5.1V Regulator Circuit

This circuit consisting of IC1(c), IC2 (d), transistors Q6 and Q7 generates regulated +5.1V DC power as in the case of +9.2V regulator circuit.

Unregulated +12V DC power is supplied to the emitter of switching transistor Q6.

The sawtooth pulse is fed to pin 8 of standby control IC1 (c), and the switching pulse obtained at pin 14 of IC1(c) is then sent to the base of switching transistor Q6 through Q7.

The regulated +5.1V DC power is obtained at TP3 (+5.1V) and supplied to other boards.

The voltage variation of +5.1V DC is detected by VR3 (+5.1V ADJ) and fed to pin 13 of comparator IC2 (d). On the other hand, regulated +4.7V DC is supplied to pin 12 of IC2 (d).

As result, the comparated output is obtained at pin 14 of IC2 (d) and fed to pin 9 of IC1 (c) controls pulse width at pin 14 of IC1 (c) so that +5.1V DC is kept constant.

10-3 +20.9V Regulator Circuit

This circuit consisting of IC3 (c) , (d) , IC4 (c) and transistor Q9 generates regulated +20.9V DC power.

Unregulated +12V DC power is supplid to coil L8 through transistor Q5.

The sawtooth pulse is fed to pin 9 of standby control IC4(c), and the switching pulse obtained at pin 14 of IC4(c) is sent to the switching transistor Q9.

The regulated +20.9V DC power is obtained at TP4 (+20.9V) and supplied to other boards. The voltage variation of +20.9V DC is detected by VR4 (+20.9V ADJ) and fed to pin 13 of comparator IC3(d). On the other hand, regulated +4.7V DC is supplied to pin 12 of IC3(d).

As a result, the comparated output is obtained at pin 14 of IC3(d) and fed to pin 9 of IC3(c) controls pulse width at pin 14 of IC4(c) so that +20.9V DC is kept constant.

10-4 −8V Regulator Circuit

This circuit consisting of IC3(b) , IC4 (b) , transistors Q10 and Q11 generates regulated −8V DC power.

Unregulated +12V DC power is supplied to the emitter of switching transistor Q10.

The sawtooth pulse is fed to pin 5 of standby control IC4 (b) through R32, and the switching pulse obtained at pin 2 of IC4 (b) is then sent to the base of switching transistor Q10 through Q11.

The regulated −8V DC power is obtained at TP5 (−8V) and supplied to other boards.

The voltage variation of −8V DC is detected by VR5 (−8V ADJ) and fed to pin 6 of comparator IC3(b) . On the other hand, regulated +4.7V DC is supplied to pin 5 of IC3 (b) .

As a result, the comparated out put is obtained at pin 7 of IC3 (b) and fed to pin 4 of IC4 (b) controls pulse width at pin 2 of IC4 (b) so that −8V DC is kept constant.

10-5 −4.8V Regulator Circuit

This circuit consisting of IC3 (a) , IC4 (a) , transistors Q12 and Q13 generates regulated −4.8V DC power as in the case of -8V regulator circuit.

Unregulated +12 DC power is supplied to the emitter of switching transistor Q12, the sawtooth pulse is fed to pin 7 of IC4 (a) through R32 , and the switching pulse obtained at pin 1 of IC4 (a) is then sent to the base of switching transistor Q12 through Q13.

The regulated −4.8V DC power is obtained at TP6 (−4.8V) and supplied to other boards.

The voltage variation of −4.8V DC is detected by VR6 (−4.8V ADJ) and fed to pin 2 of comparator IC3 (a) . On the other hand, +4.7V DC is supplied to pin 3 of IC3 (a).

As a result, the comparated output is obtained at pin 1 of IC3 (a) and fed to pin 6 of IC4 (a) controls pulse width at pin 1 of IC4 (a) so that −4.8V DC is kept constant.

10-6 Standby Control Circuit

This circuit consisting of D1, D3 and D7 stops to supply the DC voltages to other boards when the power switch on the side of the camera is set to the STANDBY position.

When the power switch is set to the STANDBY position, zero volt standby control DC from the side switch board is supplied to the cathode of D1 through pin 22 of CN2, and diodes D1, D3 and D7 are turned on. As a result, anodes of D3 and D7 become low level, and no power is supplied to other circuit of camera. However, only unregulated +12V DC power is fed to the heater of the CRT viewfinder.

10-7 Protection Circuit

This circuit consisting of Q1 and current detector R1 detect the DC current flow on the +12V DC line and generate the over current detection signal to shut off the all regulated DC voltage output.

DC current of +12V DC line flows R1 (0.2 ohm) generate the voltage drop and these voltage drop is fed to the base and emitter of Q1. If the DC current exceeds 3 Amp, voltage drop will be 0.6V and this will turn on Q1. The high voltage (approx. +8V) is fed to pin 6 of IC1(a) through pins 10 and 8 of IC2(c) to set the pin 1 of IC1(a) to low (L) level is then fed to IC1(c) and (d) and IC4(a), (b) and (c) to shut off the switching pulses and thus all regulated DC voltages are shut off.

11. Shading Board

11-1 Lens Iris Control Circuit
11-2 Dark Shading Correction Signal Generator Circuit
11-3 VTR Start/Stop Control Circuit

11-1 Lens Iris Control Circuit

This circuit controls the lens iris for all functions, and receives NAM (non-additive mixer) video signal and sends out the highest signal in order to control the lens iris automatically.

The vertical drive (VD) pulse from pin 8 of BI1 is fed to pins 8 and 9 of inverter IC3 (c). The negative VD pulse at pin 10 of IC3 (c) is fed to base of V sawtooth generator Q5.

The V sawtooth signal is generated due to time constant of R27 and C14 and it is then sent to the gate of iris gate Q8 through C29.

The non-additive mixing (NAM) signal of red (R), green (G) and blue (B) signal from pin9 of BI2 is fed through buffer Q7 to buffer Q9 where the iris gate Q8 inhibits the upper 1/4 of the NAM video signal.

This prevents unwanted influence from the sky and ceiling lights which normally come into the upper part of picture.

The gated NAM video signal at the base of Q9 is then sent to the peak value detect circuit consisting of IC4 (b) and Q10~Q12.

C16 at the emitter of Q10 stores the peak value of the gated NAM video signal. FET Q12 is turned ON by the VD pulse at the collector of Q6 and it transfers this peak value to C17 during the vertical blanking period.

The negative VD pulse at pin 10 of IC3 (c) is sent to the base of Q12 through switching amplifier Q6. Q11 is turned ON by the vertical clamp pulse (V.CP) which is supplied to the base of Q11 from pin 2 of BI3 and it discharges C16 after the peak value is sent to C17 through Q12. Therefore, the new peak value is detected by Q10 and C16 every field, and it is sent to amplifier IC4 (b).

At the same time, the upper 1/4 compressed NAM video signal obtained at the base of Q10 is buffered by Q13, integrated by R51 and C19.

The average level of NAM signal thus made is sent to IC4(c) and amplified by IC4 (c).

Then the peak value and this average value are added at VR8 (PEAK/AVERAGE). The peak to average ratio can be adjusted by VR8 for personal preference.

The upper 1/4 compressed NAM video signal obtained at the emitter of Q13 is sent to the 12 pin Lens Connector as iris video output through amplifier consisting of Q25/Q24 and pin 10 of CN2.

Q14 forces the lens iris closed by setting cathode potential of D3 to low level when camera is in the standby, color bar, auto black setting or power off mode.

The voltage obtained at the center arm of VR8 is amplified at IC4 (a) in order to meet the requirements of the lens.

VR9 (ALC LEVEL PRESET) and VR17 (ALC LEVEL) control the iris level.

VR10 (ALC GAIN) adjusts the lens hunting.

When the Lens Iris Selection Switch SW1 on the Front Switch board is set to 1/2 OPEN position, the control terminal (pin 10) of IC5 becomes low (L) level and pins 2 and 15 of IC5 are connected. As a result, the voltage at pin 3 of IC4 (a) is connected to +8.8V DC power line through R58, and the lens iris opens by a 1/2 F-stop.

When the Lens Iris Selection Switch SW1 is set to 1/2 CLOSE position, the control terminal (pin 9) of IC5 becomes low (L) level and pins 5 and 4 of IC5 are connected. As a result, the voltage at pin 3 of IC4 (a) is connected to ground through R59, and the lens iris is closed by a 1/2 F stop.

The iris control voltage obtained at pin 1 of IC4 (a) is then fed to the emitter of anticlose Q15 which it prevents the output voltage from falling below 2.5V and the iris will not close during operation. The lens iris is controlled by VR11 (ANTI-CLOSE) so that the lens iris stops at F16 even if the camera is aimed at the bright object.

The iris control voltage obtained at the emitter of Q18 is fed to the remote iris control switch Q16 and IC5 which sense a control voltage over 2V at pin 11 of BI3, and it is sent through pin 1 of CN2 to 12 pin lens connector. Q18 is the lens close switch as in the case of Q14.

Q19, Q20 and D5 generate +12V lens power. As long as the camera power is ON, +8.8V is applied to Q20 through D5, R75 and R77 turning ON Q20 and Q19., and Q20 turns on Q19 and +12V which is directly supplies the emitter of Q19 is sent through Q19 to the lens.

When the camera power is turned OFF, +8.8V power supply falls to 0V quickly, but C21 is charged and holds Q20 and Q19 ON for about 10 seconds. During 10 seconds, the +12V which does not pass through the power switch is fed to the lens and the lens iris is closed. This circuit supplies power to the lens to close the lens iris after the camera power is turned off.

11-2 Dark Shading Correction Signal Generator Circuit

This circuit makes the dark shading correction signal which flattens the dark signal waveform of R,G and B signals.

The horizontal drive (HD) pulse from the Sync board is fed through pin 1 of BI3 to H sawtooth generator Q1, Q2 and IC1

The H sawtooth signal is generated due to the time constant of R5 and C3.

The H sawtooth signal is then supplied to H shading correction controls VR1 (B-H SAWTOOTH) , VR2 (G-H SAWTOOTH) and VR3 (R-H SAWTOOTH) through amplifier IC1(b). The H sawtooth signal at pin 1 of IC1 (b) is also supplied to the H. shading correction controls through inverter IC1 (a).

The vertical drive (VD) pulse is fed from pin 8 of BI1 to V sawtooth generator Q3, Q4 and IC2.

The V sawtooth signal is generated due to the time constant of R12 and C6.

The V sawtooth signal is then supplied to V. shading correction controls VR4 (B-V SAWTOOTH) , VR5 (G-V SAWTOOTH) and VR6 (R-V SAWTOOTH) through amplifier IC2 (b). The V sawtooth signal at pin 1 of IC2 (b) is also supplied to the V. shading correction controls through inverter IC2 (a).

The H and V sawtooth signals thus obtained at the wiper arm of controls are mixed for each channel and they are sent to the base of Q26~Q28 respectively.

On the other hand, the HD pulse from pin 1 of BI3 is also sent to the H parabola generator IC7 and IC8, and then corner shading signals are generated.

The corner shading signals obtained at IC8 (a) , IC8 (b) and IC7 (a) are mixed with the H and V sawtooth signals for each channel and they are sent to the Process-1 through buffers Q26~Q28 and connector BI2 board as dark shading correction signal.

11-3 VTR Start / Stop Control Circuit

This circuit makes the recording trigger pulse for starting or stopping the VTR.

When the power switch is turned ON, potential at pin 12 of IC6(b) becomes low (L) level due to the time constant of R87 and C27 while potential at pin 8 of IC6(a) becomes high (H) level. Therefore, output of flip-flop at pin 9 of IC6 (a) is initially set to high level turning OFF Q23 and VTR is set to pause / stop mode.

When the VTR Start/Stop Button SW1 on the Rec Switch board is pressed, the low level is fed to the base of Q22, and Q22 is turned ON. The VTR start/stop pulse is obtained at the collector of Q22. The VTR start/stop pulse is then sent to the flip-flop circuit IC6 (a)/(c) through inverter IC6 (b) inverting potential at pin 9 of IC6(a) to high level. As a result, Q22 is turned ON and low (L) level is then supplied to the camera adaptor through pin 5 of BI1 and the Mother board in order to start VTR.

If SW1 is pressed again, the flip-flop is inverted and the VTR is paused.

12. Sync Board

- **12-1 Pulse Generator Circuit**
- **12-2 Gen-Lock Sync Separation Circuit**
- **12-3 Gen-Lock Subcarrier Generator Circuit**
- **12-4 28MHz Generator Circuit**
- **12-5 SC Phase Shifter Circuit**
- **12-6 H.Phase Detector Circuit**
- **12-7 SC Output Circuit**
- **12-8 +8.5V Regulator Circuit**

12-1 Pulse Generator Circuit

The CX7930A Sync Generator IC18 produces all necessary timing pulses used in the camera.

The pin identification of sync generator IC18 is as follows;

Pin No.	Name	In/Out	Description
1	VR	In	Vertical Reset Pulse
2	FLD1	Out	Not Used
3	BPF/COLB	Out	Burst Flag/Color Blanking
4	SYNC	Out	Composite Sync
5	FLD	Out	Field Pulse
6	BLK	Out	Not Used
7	LALT	Out	Line Switch
8	HD	Out	Horizontal Drive
9	4fsc out	Out	17.7MHz (4 x SC Freq.)
10	4fsc in	In	17.7MHz (4 x SC Freq.)
11	NC	-	Not Used
12	VD	Out	Vertical Drive Pulse
13	NC	-	Not Used
14	VSS	-	Ground
15	LALTRI	In	Line Switch Reset
16	TEST	In	Not Used
17	NC	-	Not Used
18	NC	-	Not Used
19	SC	Out	4.43MHz Subcarrier
20	EXT/INT	In	Mode Select Hi EXT/Li INT
21	MODE-1	In	System Select-1
22	MODE-2	In	System Select-2
23	HRI	In	Not Used
24	HCOM	Out	Phase Comparator (Inter-leaving)
25	CL OUT	Out	Not Used
26	CL IN	In	Clock
27	FH	Out	Not Used
28	VDD	-	Power

The burst flag pulse (BFP) obtained at pin 3 of IC18 is fed through low pass filter consisting of R130, C76 and C77 and inverter IC28 (a) to pin 29 of CN1.

The composite sync (SYNC) obtained at pin 4 of IC18 is supplied through inverter IC25 (a), level converter R128/R129 and next inverter IC28 (d) to pin 22 of CN1.

The field pulse (FLD) obtained at pin 5 of IC18 is supplied to pin 6 of CN1.

The line switch signal (LALT) obtained at pin 7 of IC18 is supplied through inverter IC29 (e) to pin 30 of CN1.

The horizontal drive (HD) pulse obtained at pin 8 of IC18 is fed through inverter IC25 (b) to pin 27 of Cn1 and pin 8 of OR gate IC23 (b). The HD pulse from pin 8 of IC18 is also supplied through inverter IC25 (c) to pin 6 of IC22 (c) for clamp pulse (CP) generator and pin 6 of IC24 (c) for preblanking (PRE BL) pulse generator respectively.

The vertical drive (VD) pulse obtained at pin 12 of IC18 is supplied through inverter IC28 (c) to pin 23 of CN1. The VD from pin 12 of IC18 is also supplied to pin 9 of IC15 (b) at gen-lock subcarrier osc circuit, pin 6 of IC4 for generating the V blanking signal, pin 9 of IC23 (c) and pin 6 of IC6 (c) for generating the composite blanking signal.

The subcarrier (SC) signal obtained at pin 19 of IC18 is supplied to pin 12 of IC11 (b) on the SC phase shifter circuit.

The monostable multivibrators (MMV) consisting of IC21 (d)/IC21 (C) and IC21 (b)/IC21 (a) generates vertical clamp (V.CP) pulse from VD pulse fed to pin 6 of IC21 (c). The phase of V.CP is adjusted by VR5 (V.CP PHASE) and width of V.CP is adjusted by VR4 (V.CP WIDTH).

The generated V.CP pulse obtained at pin 10 of IC21 (b) is supplied through inverter IC29 (d) to pin 14 of CN1.

Similarly, MMV consisting of IC22 (c)/IC22 (d) and IC22 (a)/IC22 (b) generates clamp pulse (CP) from HD pulse fed to pin 6 of IC22 (c). The phase of CP is adjusted by VR7 (CP PHASE) and width of CP is adjusted by VR6 (CP WIDTH).

The generated CP obtained at pin 10 of IC22 (b) is supplied through buffer consisting of IC29 (b) and IC29 (c) to pin 26 of CN1.

The monostable multivibrator (MMV) consisting of IC24 (c)/IC24 (d) generates horizontal preblanking (H. PRE BL) signal using HD pulse supplied to pin 6 of IC24 (c) with VR9 (H. PRE BL WIDTH) and it's obtained at pin 3 of IC3 (d). The other MMV consisting of IC24 (a)/IC24 (b) generates vertical preblanking (H. PRE BL) signal using VD pulse supplied to pin 13 of IC24 (a) with VR8 (V. PRE BL WIDTH) and it's obtained at pin 10 of IC24 (b). The both H. PRE BL and V. PRE BL are supplied to pins 13 and 12 of OR gate IC23 (d) to produce composite preblanking (PRE BL) signal. The PRE BL obtained at pin 10 of IC23 (a) is supplied through buffer IC29 (a) to pin 13 of CN1.

The HD pulse and the VD pulse are supplied to pins 8 and 9 of IC23 (b) respectively, where these pulses are mixed, and the composite vertical sample (C. V SAMPLE) pulse is produced and is supplied through inverter IC28 (f) to pin 12 of CN1.

The Hd pulse from pin 8 of IC18 is directory supplied to pin 4 of IC4 and the HD is also supplied through phase shifter IC5 (b) to pin 5 of IC4 respectively. Other hand, VD pulse (A) from pin 12 of IC18 is supplied to pin 16 of shift resistor IC4. In IC4, VD pulse is shifted to 25H periods by counting both HD (B) and shifted HD (C) pulses, and 25H delayed VD pulse (D) is obtained at pin 19 of IC4. This signal is supplied to pin 5 of IC6 (b) and VD pulse (E) from pin 12 of IC18 is supplied to pin 1 of IC6 (c). As a result, 25H width of vertical blanking (V. BL) pulse (F) is generated utilizing flip-flop (FF) consisting of IC6 (b) and IC6 (c). The V. BL pulse obtained at pin 6 of IC6 (c) is supplied to pin 12 of INVERT OR gate IC6 (d) and HD pulse from pin 8 of IC18 through phase shifter IC5 (a) to pin 13 of IC6 (d) where both V.BL and HD are mixed and composite blanking pulse is generated. The composite blanking pulse obtained at pin 11 of IC6 (d) is supplied through inverter IC28 (b) to pin 25 of CN1.

VR1 (SYSTEM BLANKING PHASE) controls for setting the phase of HD pulse of composite blanking signal.

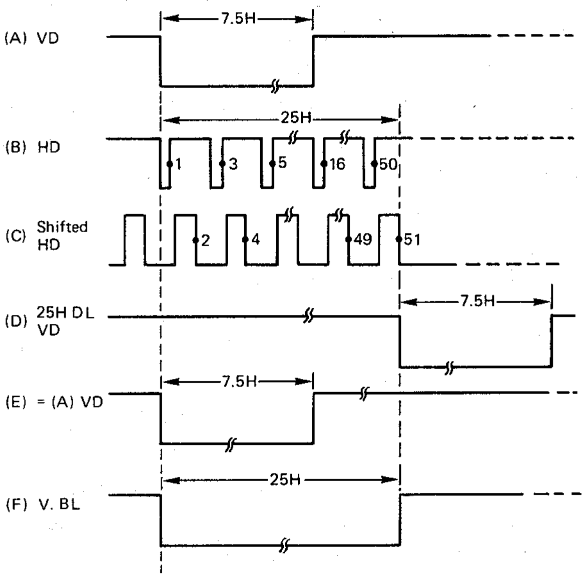


Fig. 12-1 V. Blanking Pulse

The V. Blanking (V. BL) thus obtained at pin 3 of IC6 (c) is supplied through inverter IC28 (a) to pin 24 of CN1.

The OB clamp pulse from pin 28 of Cn1 is supplied through VR2 (RESET TIMING ADJ) and waveform compensator IC32 to pin 4 of IC12 (a). The 28.375MHz signal generated by 28MHz generator circuit is supplied to pin 3 of IC12 (a). In IC12 (a) 28MHz is divided 1/2 and 14MHz signal which is triggered by OB clamp pulse is generated, and is supplied to pin 26 of sync generator IC18 as reference clock signal.

When black burst signal or composite video signal is externally supplied to the gen-lock input connector on the rear of camera or on the remote control unit (RCU), H sync signal is detected by gen-lock sync separation circuit and is supplied through equalizing/selection pulse eliminator IC2 (a) and DC converter consisting of R34 and C13 to inverter IC1 (a). While no gen-lock signal is supplied to camera, pin 10 of IC1 (a) becomes high (H) level and is supplied to gen-lock subcarrier OSC circuit, SC phase shifter circuit and 28MHz generator circuit for internal sync mode. Also the pin 10 of IC1 (a) is fed through inverter IC1 (b) to pin 20 of IC18 for making the sync generator IC18 works internal sync mode. Other hand, gen-lock signal is supplied to camera, reverse functions are takes place to external sync mode.

12-2 Gen-Lock Sync Separation Circuit

This circuit receives the black burst signal or composite video signal supplied to the gen-lock input connector on the rear of camera or on the remote control unit (RCU), and separates the burst and sync signal from the gen-lock signal. The separated sync and burst signals are fed to the sync generator IC18 and 28MHz (6.4fsc) generator circuit.

The gen-lock signal (the black burst or color signal) is sent from pin 2 of CN1 through buffer Q1 to amplifier Q2. The amplified gen-lock signal obtained at the collector of Q2 is fed through buffer Q3 to sync separator Q4.

The separated sync signal obtained at collector of Q4 is supplied to equalizing/selection IC2 (a). (Refer to the Pulse Generator Circuit).

The sync signal at collector of Q4 is fed through low pass filter consisting of R160/R161 and C92/C93 where the vertical (V) sync signal is detected. The V sync signal is fed through waveform compensator Q5 and Q6 to pin 1 of inverter IC1 (a). The V sync signal obtained at pin 2 of IC1 (c) is supplied to pin 1 of sync signal generator IC18 for setting the generate timing of each signal at gen-lock mode. The V. sync signal also supplied to 3rd field detection circuit consisting of IC27 (a) and IC27 (b) where the only V. sync signal at 3rd field is detected. VR11 (FIELD ADJ) controls for setting the phase of the 3rd field V. pulse.

The detected 3rd field V. pulse obtained at pin 5 of IC27 (b) is supplied to pin 5 of AND gate IC15 (b).

Other hand, burst pulse from pin 3 of IC15 (a) is supplied to pin 4 of IC15 (b) where the burst signal at 3rd field is gated and obtained at pin 6 of IC15 (a). This signal is fed through buffer IC13 (b) and line switch generator IC12 (b) to pin 15 of IC18 to reference (0°) signal of subcarrier (SC) signal generator in IC18.

12-3 Gen-Lock Subcarrier Generator Circuit

The gen-lock signal from emitter Q1 is supplied through band pass filter consisting of L11 and C111 where 4.43MHZ subcarrier signal from gen-lock signal is detected. This signal is supplied through amplifier Q7, buffer Q8 and waveform compensator consisting of Q9/Q10 to pin 2 of AND gate IC15 (a).

The burst gate pulse from pin 5 of IC3 (a) is supplied to pin 1 of IC15 (a) therefore, burst signal is obtained at pin 3 of IC15 (a).

This signal is supplied to pin 12 of phase comparator IC13(c) where the phase of burst signal is compared with respective 0°, 90°, 180° or 270° SC signal from SC phase shifter circuit. The detected phase differences is supplied to control terminal (pin 10) of analog switch IC14 (a).

While gen-lock signal is supplied to camera, control terminal (pin 11) of IC14 (b) is high level and between pins 14 and 13 are conducted and detected phase difference signal obtained at pin 13 of IC14 (b) is converted to DC level by DC converter consisting of R194/R195 and C117/C118. This DC level is supplied through amplifier IC31 (a) and the amplified DC level obtained at pin 1 of IC31 (c) is supplied to 17.7MHz voltage controlled oscillator (VCO) consisting of D3, CT3 and X2 for forming phase-locked loop (PLL) to control the oscillation frequency by changing the capacitance of variable capacitance diode D3. The 17.7MHz is supplied through amplifier Q12, buffer Q13 and internal/external selection switch IC14 (c) to pin 10 of IC18. CT3 (SC LOCK) control for adjusting the oscillation frequency. When no gen-lock signal is supplied to camera, base of Q11 becomes high level to ON therefore, crystal oscillator is not functioned and internal 17.7MHz oscillator (TCXO) is functioned. The internal 17.7MHz signal from pin 1 of TCXO is supplied through buffer Q14 and internal/external selection switch IC14 (c) to pin 10 of IC18.

12-4 28MHz Generator

o Internal 28MHz Generator

When no gen-lock signal is supplied to the camera, pins 1 and 2 of IC30 (a) and pin 13 of IC30 (d) become high level as a result, internal 28MHz generator consisting of D4, X1 and CT1 (INTER LEAVING) generates 28MHz signal. At this time, inter leaving DC level which compensates phase of subcarrier signal to HD pulse by changing the oscillation frequency which control the value of the variable capacitance diode D4 is supplied from pin 24 of IC18.

o External 28MHz Generator

When gen-lock signal is enter to the camera, pin 13 of IC30 (d) becomes low level therefore, external 28MHz voltage controlled oscillator (VCO) consisting of IC30 (b), R3, C3-C5, D2 and CT2 (H LOCK).

The generated 28MHz signal obtained at pin 8 of IC30 (c) is supplied to other circuit through pin 17 of CN1. The 28MHz signal is also supplied to pin 3 of 1/2 divider IC12 (a) to generates 14MHz signal and is supplied to pin 26 of IC18.

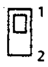
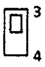
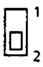
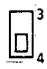
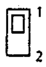
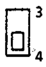
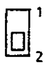
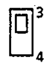
12-5 SC Phase Shifter Circuit

This circuit generates from kinds of SC phase signal. The subcarrier (SC) signal from pin 19 of IC18 is supplied to D-type flip-flop IC11 (a) and IC11 (b) and each phase of SC signal is produced as shown below.

Output of IC11

Pin No.	Pin 9	Pin 8	Pin 5	Pin 6
SC Phase	0°	90°	180°	270°

The shifted SC signals obtained at pins 9, 8, 5 and 6 of IC11 is selected in step by setting SW5 (SC PHASE COARSE-1) and SW6 (SC PHASE COARSE-2) on the shading board with analog switch IC10 and as shown below.

Position of Switches								
Subcarrier Phase	0°		90°		180°		270°	
Position of Switches								
Condition of IC10								
Potential of control pins 2 and 14	L	L	H	L	L	H	H	H
Pin No. of Output	6-7		4-7		5-7		3-7	

SW5 (SC PHASE COARSE-1) ··· Control pin No.2
SW6 (SC PHASE COARSE-2) ··· Control pin No.14

The 4.43MHz signal (A) obtained at pin 7 of IC10 is sent to pin 2 of monostable multivibrator (MMV) IC9 (a) and the signal (B) is obtained at pin 4 of IC9 (a). The pulse width is adjusted by VR16 (SC PHASE) on the shading board through pin 10 of CN1.

As a result, the phase of SC signal (c) can be shifted more than 90° continuously by VR16. In this way, the phase of SC signal obtained at pin 5 of IC9 (b) is shifted more than 360° by use of SW5, SW6 and VR16 on the Shading board. The signal (c) is then sent to pin 10 of next MMV IC9 (b) and the signal (c) whose duty is 50% - 50% is obtained at pin 5 of IC9 (b). This signal is supplied to phase comparator on the gen-lock subcarrier OSC circuit.

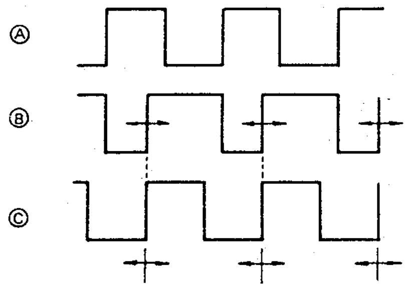


Fig. 12-2 SC Phase Shifter

12-6 H. Phase Detector Circuit

This circuit generates subcarrier phase control DC voltage in order to coincide the horizontal phase with that of other cameras and special effects generator in the system operation.

The horizontal sync signal from pin 5 of IC2 (a) is supplied to pin 2 of phase shifter IC3 (b) where the horizontal phase of H.sync pulse are delayed by the camera H.phase control signal or RCU H. phase control signal.

The RCU H.phase control signal from pin 5 of CN1 is fed to pin 12 of IC7 and camera H.phase control signal is fed to pin 13 of IC7 respectively and output obtained at pin 14 of IC7 which is selected by the camera/RCU select signal supplied to control terminal pin 11 of IC7. The control signal obtained at pin 14 of IC7 is supplied through amplifier IC20 (b) to phase control terminal pin 15 of IC3 (b).

The phase shifted H.sync pulse obtained at pin 4 of IC3 (b) is supplied to pin 7 of IC19. Other hand delayed H.sync signal from pin 8 of IC18 through IC8 (a) is supplied to pin 8 of IC19 where the both H.sync signals are compared in phase and phase difference is converted to DC level by converter R171/R172 and C100/C101. This DC level is inverted by inverter in IC19 and output obtained at pin 1 of IC19 is supplied to external 28MHz oscillator circuit for control the oscillating frequency by changing the capacitance of variable capacitance diode D2.

12-7 SC Output Circuit

This circuit generates 1/4 SC signal for zebra signal and SC output circuit.

The SC signal from pin 9 of IC11 (b) is supplied to 1/4 SC signal generator consisting of IC26 (a) and IC26 (b). The 1/4 SC signal obtained at pin 9 of IC26 (a) to other circuit through pin 21 of CN1.

The SC signal is also supplied to base of phase shifter Q19.

The phase of SC signal is adjusted by VR10 (SC/H) for matching the phase of H.sync signal and SC signal. The phase shifted SC signal is supplied through buffer Q18 to pin 28 of CN1.

12-8 +8.5V Regulator Circuit

The +8.5V DC used in this board is generated by IC20 (a) and Q15 using +9.2V DC.

The +9.2V DC is divided by R98 and R99 and approximately +4.6V DC is supplied to pin 2 of IC20 (a) as reference voltage. The output from collector of Q15 is divided by R100 and R102, and supplied to pin 3 of IC20 (a) where both pins 3 and 2 are compared, and error DC obtained at pin 1 of IC20 controls base bias of Q15. As a result, +8.5V DC is regulated.

13. Mother Board

13-1 **R and B Gain Control Selection Circuit**
13-2 **Pedestal Control Selection Circuit**
13-3 **Camera/RCU Color Bar Selection Circuit**
13-4 **Detail ON/OFF Control Circuit**
13-5 **High Gain Control Selection Circuit**
13-6 **Battery Warning Circuit**

13-1 R and B Gain Control Selection Circuit

This circuit receives the DC voltages from the RCU or Auto board and sends them to the Process-1 board for controlling the amplitude of R and B signals.
The analog switch IC1 (a) for the Camera/RCU selection and white balance selection modes become as shown in the table below.

Output of IC1 (a)

CAMERA/RCU SELECTION	CAMERA		RCU	
CONTROL TERMINAL (Pin 10)	H		L	
INPUT TERMINAL (Pins 1 and 2)	AWC/PRESET		AUTO/MANUAL	
OUTPUT TERMINAL (Pin 15)	AWC	PRESET	AUTO	MANU
	H	L	H	L

The R and B gain is controlled by analog switches IC1 (b), (c), IC2 (a) and (b) as shown in the table below.

WHITE BALANCE SELECTION MODE	RCU	R/B GAIN CONTROL
AWC	WITHOUT RCU	CAMERA
PRESET		—
AUTO	WITH RCU	AUTO
MANUAL		RCU

When the Auto/Manual Selection Switch on the RCU is set to MANUAL position in the RCU operation, the DC voltages set by B GAIN and R GAIN controls on the RCU are sent to the Process-1 board through IC1(b)/(c) and IC2(a)/(b) respectively.
When the White Balance Selection Switch SW2 on the Side Switch board is set to the P. SET (Preset) position or the Auto/Manual Selection Switch on the RCU is set to the AUTO position, the DC levels from the Auto board is fed to the Process-1 board for automatic white balance setting.
When the White Balance Selection Switch SW2 on the Side Switch board is set to the AWC A or B position without RCU, the DC voltages set by VR14 (B GAIN) and VR13 (R GAIN) on the Shading board are sent to the Process-1 board through IC1(b) /(c) and IC2(a) /(b) respectively.

13-2 Pedestal Control Selection Circuit

This circuit sends the DC voltage to the Process-1 board for controlling the pedestal level of R,G and B signals.
The total pedestal DC voltage from the RCU and camera are respectively sent to pins 5 and 3 of analog switch IC3 (b) through pin 3 of CN12 and pin 1 of CN10. The analog switch IC3 (b) is controlled by RCU/Camera Selection signal which is supplied to the control terminal (pin 11) of IC3 (b) from the RCU.
When the Camera /RCU Selection signal is high (H) level, the total pedestal control DC voltage set by VR12 (TOTAL PEDESTAL) on the Shading board through pin 4 of analog switch IC3 (b) is obtained at pin 7 of buffer IC4 (b).
When the Camera/ RCU Selection Signal is low (L) level, the total pedestal control DC voltage set in the RCU and sent through pin 4 of analog switch IC3 (b) is obtained at pin 7 of buffer IC4 (b).
On the other hand, the R pedestal DC voltage from the RCU and camera are fed to pins 12 and 13 of analog switch IC2 (c) through pin 5 of CN 12 and pin 14 of CN103 respectively.
When the Auto/Manual Selection Switch on the RCU is set to the Auto position, the high (H) level is supplied to the control terminal (pin 11) of IC2 (c) and the R pedestal DC voltage of camera controlled automatically is obtained at pin 14 of analog switch IC2 (c).
When the Auto/Manual Selection Switch on the RCU is set to the Manual position, the low (L) level is fed to the control terminal (pin 11) of IC2 (c) ,and the R pedestal DC voltage of RCU controlled by R pedestal control on the RCU manually is obtained at pin 14 of analog switch IC2 (c).
The B pedestal DC voltage is obtained at pin 15 of analog switch IC3 (a) in the same manner as R pedestal DC voltage.
The R and B pedestal DC voltages obtained at pins 14 and 15 of analog switch IC2 are mixed with the total pedestal DC voltages which are supplied to pins 14 and 15 of IC2 through R9 and R8 respectively.
The G pedestal DC voltage (approximately +6.7V) generated by IC4(a) is mixed with the total pedestal DC voltage through R6 as a reference voltage.
As a result, R, G and B pedestal DC voltages are fed to the process-1 board through pins 27, 26 and 25 of CN101 for controlling the pedestal level of R, G and B signals respectively.

13-3 Camera/RCU Color Bar Select Circuit

This circuit selects the bar/camera select signal supplied from the side switch board on the camera or the remote control unit (RCU) and supplies it to the other circuit.

When the camera is used without RCU, the camera/RCU select signal supplied from the camera adaptor to the control terminal (pin 11) of IC3 (c) becomes high (H) level, and pins 13 and 14 of IC3 (c) are connected.
In this case, the camera/bar selection is controlled by SW3 (COLOR BAR/CAMERA SELECTION SWITCH) on the side switch board.
When the camera is used with RCU, the camera/RCU select signal becomes low (L) level and pins 12 and 14 of IC3 (c) are connected and the camera/bar selection is controlled by RCU.

13-4 Detail ON/OFF Control Circuit

This circuit selects the detail ON/OFF signal supplied from the Shading board or the RCU and supplied it to the detail board.
When the camera is used without the RCU, the camera/RCU selection signal which is supplied to the control terminal (pin 9) of IC7 (b) becomes high (H) level, and pins 3 and 4 of IC7 (b) are connected. In this case, the detail level is selected by SW3 (DETAIL LEVEL SELECTION SWITCH) on the Shading board in three steps.
When the camera is used with RCU, the detail ON/OFF signal becomes low (L) level, and pins 5 and 4 of IC7 (b) are connected. In this case, the detail level is selected by SW3 (DETAIL LEVEL SELECTION SWITCH) when the Detail ON/OFF switch on the RCU is set to ON position.

13-5 High Gain Control Selection Circuit

This circuit makes the gain control signal in order to set the R, G and B signal level on the Process board when the High Gain Selection Switch SW1 on the side switch board is set to +9dB or +18dB position, and lights the high gain indicator on the 1.5" viewfinder.
When the High Gain Selection Switch on the camera or RCU is set to +9dB (Gain-1) position, the low (L) level is supplied to pins 1 and 2 of analog switch IC6 (a) through pin 1 of CN2 and pin 13 of CN12 respectively. The analog switch IC6 (a) is controlled by the Camera/RCU selection signal supplied to pin 10 of analog switch IC6 (a) (H: Camera/L: RCU). The low (L) level obtained at pin 15 of IC6 (a) is sent to pin 13 of analog switch IC6 (c). The analog switch IC6 (c) from pin 2 of CN103. As a result, the low (L) level obtained at pin 14 of IC6 (c) is sent to the Process-1 board through pin 23 of CN101 in order to control the R, G and B gain on the Process-1 board, and it is also fed to the 1.5" viewfinder in order to light the high gain indicator on the 1.5" viewfinder.
When the High Gain Selection Switch on the camera or RCU is set to +18dB (Gain-2) position, the low (L) level is supplied to pins 3 and 5 of analog switch IC6 (b) through pin 2 of CN2 and pin 12 of CN12 respectively. The low (L) level obtained at pin 4 of IC6 (b) is sent to pin 1 of analog switch IC7 (a). As a result, the low (L) level obtained at pin 15 of IC7 (a) is sent to the Process-1 board through pin 21 of CN101 in order to control the R, G and B gain on the process-1 board, and it is also fed to the 1.5" viewfinder in order to light the high gain indicator on the 1.5" viewfinder in the same manner as that of +9dB.

13-6 Battery Warning Circuit

This circuit detects the level of battery for VTR or camera, and blinks the indicator on the 1.5" viewfinder when the DC power of the camera or VTR battery becomes less than +10.6V. When the DC power of the camera or VTR becomes less than +10.6V, the battery warning signal (low level) is supplied to base of transistor Q2 or Q3 and it is turned OFF. As a result, high (H) level obtained at the collector of Q2 or Q3 is fed to the 1.5" viewfinder through pin 7 of CN3 and viewfinder connector CN101 in order to blink the battery warning indicator on the 1.5" viewfinder.

14. Camera Adaptor

14-1 Microprocessor Circuit
14-2 Audio Amplifier Circuit
14-3 Signal Output Circuit
14-4 RCU Power Control and RCU / Camera Select Circuit
14-5 Playback Control Circuit
14-6 Recording Trigger Circuit

14-1 Microprocessor Circuit

This circuit consisting of IC9 ~ IC13, IC6 - IC24 and Q19 ~ Q21, Q34 ~ Q37 receives information from the remote control unit as a serial data (digital signal) and converts it into analog signals, and they are are then sent to camera head as control signals.

The control signals such as R and B gain, high gain – 1 and 2, R and B gain, R and B pedestal, auto white control and auto black control etc, from the remote control unit, are converted into digital signal (serial data) in the remote control unit. The serial data from RCU is supplied to pin 6 of buffer/comparator IC24 (b) through pin 1 of CN16 and pin 16 of VTR/RCU connector CN3, and IC24 (b) compensates the cable loss of the camera cable. The serial data obtained at pin 7 of IC24 (b) is then fed to pin 20 of microprocessor IC23.

The control pulse (signal) from the RCU is also supplied to pin 2 of buffer/comparator IC24 (a) through pin 2 of CN16 and pin 15 of VTR/RCU connector CN3, and IC24 (a) also compensates the cable loss of the camera cable. The control pulse obtained at pin 1 of IC24 (a) is then fed to pin 21 of microprocessor IC23 as a serial clock pulse (a synchronization pulse for data transmission) .

The microprocessor IC23 decodes the serial data and instructs it from pin 3 to pin 6 (R0 ~R3) and pin 15 to pin 18 (O3 ~O0) of IC23 as a 8 bit-digital data to D/A converter Z1 through buffer IC21.

The analog signal obtained at pin 10 of D/A converter Z1 is fed to the output selector consisting of IC17 and IC18 through buffer IC13 (b) and pins 3 of IC17 and IC18.

The output voltages obtained at pins 1, 2, 4, 5, 13 and 15 of IC17 and pins 1, 2, 4, 5, 12, 13, 14 and 15 of IC18 are supplied to the camera head through IC9 - IC13 and Q19 - Q21, Q34 - Q37 and 50 pin connector board as shown in Fig. 14-1.

The OR gate IC19 and NAND gate IC20 consist a part of output select circuit driven by microprocessor IC23.

IC16 generates the reset pulse for microprocessor IC23 and the reset pulse obtained at pin 8 of IC16 is fed to pin 19 of microprocessor IC23 through buffer Q42.

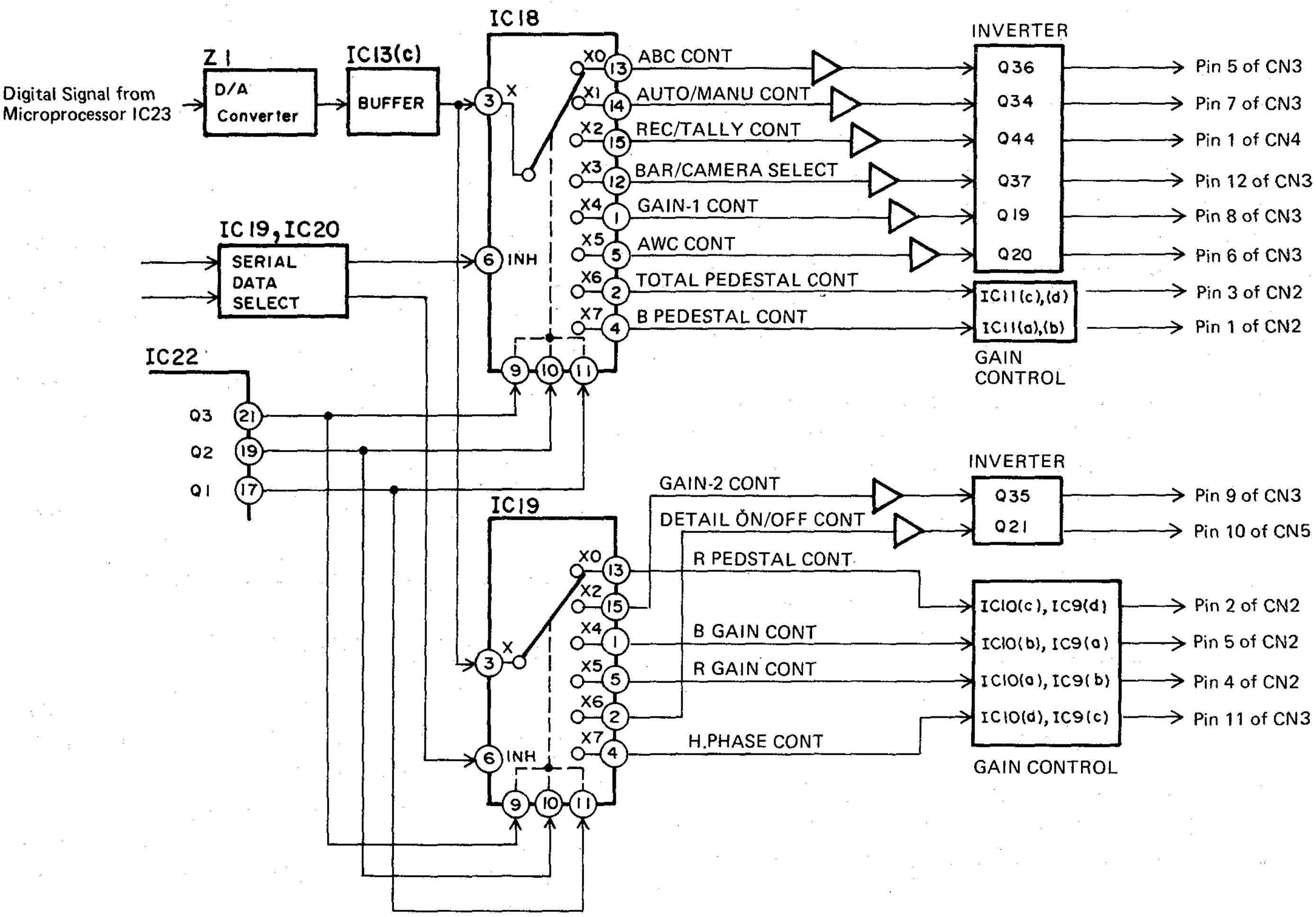

Digital Signal from Microprocessor IC23
Z1
D/A Converter
IC13(c)
BUFFER
IC18
X
INH
X0
X1
X2
X3
X4
X5
X6
X7
ABC CONT
AUTO/MANU CONT
REC/TALLY CONT
BAR/CAMERA SELECT
GAIN-1 CONT
AWC CONT
TOTAL PEDESTAL CONT
B PEDESTAL CONT
INVERTER
Q36
Q34
Q44
Q37
Q19
Q20
IC11(c),(d)
IC11(a),(b)
GAIN CONTROL
Pin 5 of CN3
Pin 7 of CN3
Pin 1 of CN4
Pin 12 of CN3
Pin 8 of CN3
Pin 6 of CN3
Pin 3 of CN2
Pin 1 of CN2
IC19,IC20
SERIAL DATA SELECT
IC22
Q3
Q2
Q1
21
19
17
IC19
GAIN-2 CONT
DETAIL ON/OFF CONT
R PEDSTAL CONT
B GAIN CONT
R GAIN CONT
H.PHASE CONT
INVERTER
Q35
Q21
Pin 9 of CN3
Pin 10 of CN5
IC10(c), IC9(d)
IC10(b), IC9(a)
IC10(a), IC9(b)
IC10(d), IC9(c)
GAIN CONTROL
Pin 2 of CN2
Pin 5 of CN2
Pin 4 of CN2
Pin 11 of CN3

Fig. 14-1 Microprocessor Circuit

14-2 Audio Amplifier Circuit

This circuit consisting of IC4 ~ IC6 and Q12 amplifies audio signal picked up by the microphone. The amplified audio signal is fed to the VTR for recording and audio monitor jack.

The −70dB audio signal picked up by the microphone connected to CN1 on the MIC board is sent to pin 3 of CN1. The audio signal is supplied to amplifier IC4 and amplified +50dB. As a result, the −20dB audio signal obtained at pin 4 of IC4 is fed to pin 1 of IC5 through C15. On the other hand, the −20dB audio signal at pin 4 of IC4 is devided by R44 and R45, and −60dB audio signal is obtained at pin 2 of IC5 through buffer Q12. The audio signal level is selected by the Audio Level Selection Switch SW1 on the Switch board.

When SW1 on the switch board is set to −60dB position, the low (L) level is fed to the control terminal (pin 10) of IC5 and pins 2 and 15 of IC5 are connected.

When SW1 is set to −20dB position, the high (H) level is supplied to pin 10 of IC5, and pins 1 and 15 of IC5 are connected. The amplified audio signal obtained at pin 15 of IC5 is sent to the VTR for recording through pin 2 of CN19 and pin 12 of VTR/RCU connector CN3.

The −20dB audio signal is also supplied to pins 3 and 13 of analog switcher IC5. When the audio monitor selection switch SW4 on the switch board is set to INT position, the control terminals (pins 9 and 11) of IC5 become high (H) and pins 3 & 4 / 13 & 14 are connected. As a result, the −20dB audio signal at pin 4 of IC5 is sent to the auto board for indicating the audio output level from the microphone, and the −20dB audio signal at pin 14 of IC5 is fed to the intercom jack J3 for communication between the camera operator and operators of the RCU and special effect generator in the system.

When the audio monitor selection switch SW4 is set to PB (playback) position, the control terminals (pins 9 and 11) of IC5 become low (L) and pins 5 and 4 / 12 and 14 are connected. As a result, the playback audio signal from the Panasonic 3/4" U-vision recorder or an S-VHS recorder is supplied to the audio board for indicating the level of playback audio signal and to the intercom jack JK3 monitoring the playback audio signal.

The audio signal from the camera operator and operators of the RCU and special effect generator is fed to pin 3 of amplifier IC6 through pin 4 of CN8. The amplified audio signal at pin 5 of IC6 is sent to the audio monitor jack JK1 through pin 2 of CN21.

14-3 Signal Output Circuit

This circuit consisting of Q25 - Q30 receives R, G, B, Chrominance (C) and Luminance (Y) signal from the camera head and sends them to the RCU through VTR/RCU Connector CN3.

The B signal at pin 6 of CN5 is sent to pin 27 of VTR/RCU connector CN3 through the output amplifier Q25/Q26 and pin 6 of CN13.

The G and R signals at pins 5 and 4 of CN5 are fed to the RGB /YC Selection Switch SW1 through the output amplifiers Q27 /Q28 and Q29/Q30 respectively. On the other hand, the chrominance (C) and luminance (Y) signals at pins 1 and 2 of CN6 are also sent to SW1 through the output amplifiers Q38/Q39 and Q40/Q41 respectively, and G/R or Y/C signal are selected by SW1 and it is supplied to pins 26 and 25 of VTR/RCU connector CN3 through pins 8 and 10 of CN13 respectively.

14-4 RCU Power Control and RCU/Camera Select Circuit

This circuit consisting of IC14 (a), IC15, Q8, Q31 and Q32 receives the serial data signal from RCU, and generates +9V DC RCU mode signal when the serial data is supplied and is supplied to all circuits on the main board.

The serial data pulse is fed to pin 4 of monostable multivibrator IC14 (a). The time constant of R133 and C46 are set to longer than transmission interval time.

As a result, the output (pin 6) of IC14 (a) becomes high (H) level during the serial data pulse is being supplied to pin 4 of IC14 (a). The high (H) level at pin 4 of IC14 (a) then becomes low (L) level through inverter Q31 and it is sent to other circuit and camera head as a RCU/Camera select pulse.

On the other hand, the negative output (pin 7) of IC14 (a) becomes low (L) level during the serial data pulse is being supplied to pin 4 of IC14 (a). As a result, the +9V DC power ON/OFF control Q8 is turned OFF and the +12V DC power from pins 1, 2 and 3 of CN17 is supplied to the emitter of Q32. +9V DC power obtained at the collector of Q32 is divided by R139, VR1 (+9V ADJ) and R71 so that the voltage drift is fed to the error amplifier IC15. The control output obtained at pin 1 of IC15 is sent to the base of Q32. The +9V DC power obtained at the collector of Q32 is supplied to all circuits on the main board.

When no signal is supplied to pin 4 of IC14 (a) , Pin 7 of IC14 (a) becomes high (H) level and Q8 is turned ON. As a result, pin 3 of IC 15 becomes low (L) and IC15 stops to supply the +9V DC power to all circuits on the main board.

14-5 Playback Control Circuit

This circuit consisting of IC7, IC8, Q14 and Q15 sends the video signal to the VTR for recording through 32-pin VTR/RCU connector and send the playback video signal to the viewfinder when the VTR is set to the playback mode.

When the portable VTR is set to the playback mode, the playback DC signal (Approx. +5 ~ +6V) from the VTR is sent to pin 2 of comparator IC8(a) through VTR/RCU connector CN3, pin 1 of CN15, R61 and R63. The potential at pin 2 of comparator IC8(a) is higher than that of pin 3. As a result, low (L) level is obtained at pin 1 of IC8(a), and it is sent to the control terminals (pins 9 and 10) of IC7(a) / (b).

The playback video signal is also supplied to pin 2 of IC7(a) through R67 and buffer Q15, and it is sent to pin 12 of analog switch IC7(c) since the control terminal (pin 10) of IC7(a) is low (L) level.

The playback video signal at pin 12 of IC7(c), buffer Q43, pin 4 of CN4 and camera head since the return control signal which is supplied to the control terminal (pin 11) of IC7(c) is low (L) level.

When the portable VTR is in the recording mode, the potential at pin 2 of comparator IC8(a) is lower than that of pin 3 since no signal is supplied. The high (H) potential obtained at pin 1 of IC8(a) is fed to the control terminals (pins 9 and 10) of IC7(a) / (b), and pins 3 & 4 of IC7(b) and pins 1 & 15 of IC7(a) are connected.

As a result, the video signal from the Encoder board is sent to pin 1 of VTR/RCU connector CN3 through Q14, D1(b), R61 and pin 1 of CN15. On the other hand, the lineview signal which is supplied to the AUX connector on the RCU from the special effects generator is fed to pin 1 of IC7(a) through VTR/RCU connector CN3 and pin 4 of CN18 when the system is connected.

The lineview signal at pin 1 of IC7(a) is supplied to the viewfinder through IC7(a), buffer Q13, pin 4 of CN4 and camera head.

14-6 Recording Trigger Circuit

This circuit consisting of IC1, IC2, Q2 - Q6 receives the recording trigger pulse from the Shading board through the Mother board and generates the recording Start / Stop pulse for VTR connected to the camera.

The recording trigger pulse obtained at pin 4 of CN4 is sent to inverters Q2, Q4 and Q5 respectively. The recording trigger pulse at the base of Q2 is fed to pin 4 of CN10 through inverters Q2 and Q3 for Panasonic's 1/2" VHS VTRs. The recording trigger pulse at the base of Q5 is supplied to pin 3 of CN10 through inverter Q5 for other manufacture's VTRs. As a result, the logic level of the camera trigger for different polarity of VTR may be incompatible and reversed, so that the VTR stops when it should run and vice versa.

The recording trigger pulse at the base of Q4 is supplied to inverter Q4, and the DC voltage which is obtained at pin 5 of IC25 is added to the inverted recording trigger pulse. The recording trigger pulse at the collector of Q4 is sent to pin 2 of CN10 for Panasonic's 3/4" U-vision VTRs.

The recording trigger pulses obtained at pins 2, 3 and 4 of CN10 is fed to the VTR Compatibility Switch SW3 on the Switch board through pins 10, 11 and 12 of BI1. This switch selects the recording trigger pulse according to the VTR which is connected to the camera.

The selected recording trigger pulse is fed to the VTR through pin 9 of BI1 on the Side Switch board, pin 1 of CN10, pin 1 of CN14 on the Main board and pin 3 of 32-pin VTR/RCU connector.

15. 1.5" Electronic Viewfinder WV-VF38

15-1 Video Amplifier Ciecuit

15-2 Sync Separation and V Blanking Pulse Circuit

15-3 Vertical/ Horizontal Deflaection Circuit

15-4 High Voltage Circuit

15-5 Indicator Drive Circuit

15-1 Video Amplifier Circuit

This circuit receives the video signal from the EVF video output circuit in the Encoder board. The video signal is amplified and sent to the grid-1 (G1) of cathode ray tube (CRT).

The video signal at pin 5 of CN1 on the Main board is fed to amplifiers Q4 and Q5 through buffer Q2 and VR2 (CONTRAST). The V blanking (BL) pulse obtained at pin 5 of VIC board and H blanking (BL) pulse obtained at pin 3 of flyback transformer (FBT) T1 are sent through inverter Q6 to the emitter of Q5 where the V BL pulse and H BL pulse are mixed with the video signal for eliminating the retrace line on the CRT screen. The amplified video signal which is mixed with the V BL pulse is applied from the collector of Q5 to grid-1 of CRT through buffer Q7. The voltage which is set by VR5 (BRIGHT) and VR7 (SUB-BRIGHT) is mixed with the video signal through R29 and sent to G1 of CRT for setting the brightness of picture. When SW1 (PEAKING ON / OFF SWITCH) is set to the ON position, the frequency response at 3 MHz portion of video signal is increased for making optical focus adjustment of picture in the viewfinder easily.

15-2 Sync Separation and V Blanking Pulse Circuit

This circuit receives the video signal and separates the sync signal from the video signal. This circuit also generates the Vertical Blanking pulse from the V. sync signal.

The video signal obtained at the emitter of Q2 is applied through pin 4 of VIC board to sync separator Q9 which detects only the sync signal. The sync signal at the collector of Q9 is sent through pin 3 of VIC board and inverter Q8 to the Vertical / Horizontal Deflection Circuit.

The sync signal at the collector of Q9 is also fed to integrator consisting of R45 / C36 / R46 where the horizontal (H) sync is removed and only the vertical (V) sync remains. The V sync signal is fed to pin 5 of V blanking pulse generator IC3 and the V. blanking pulse obtained at pin 6 of IC3 is sent to the video amplifier circuit through pin 5. The width of V. blanking pulse is controlled by VR6 (V. BLANKING) .

15-3 Vertical / Horizontal Deflection Circuit

This circuit generates horizontal (H) and vertical (V) deflection sawtooth current for horizontal and vertical scanning of beam inside the cathode ray tube (CRT) respectively.

o **Horizontal Deflection Circuit**

The H. sync pulse obtained at the collector of Q8 is sent through pin 11 of IC2 to the phase comparator in IC2 where the H sync signal is compared with the H sawtooth signal which is generated from the H flyback pulse obtained at H. OSC circuit with integrator consisting of R12, R13, C11 and C12 and sent through pin 5 of IC2. The phase difference between two signals is converted into the DC potential and it is sent through pin 3 of IC2 to the H oscillator to control the oscillating frequency. As a result, the H oscillator oscillates the signal whose frequency and phase match to those of H sync signal. VR3 (H HOLD) is a control for setting the oscillation frequency in a steady state. The H pulse is then fed to H deflection output Q11 through the H deflection drive circuit inside IC2.The H sawtooth current obtained at the collector of Q11 is supplied through pin 4 of CN4 to the H deflection coil.

The flyback pulse obtained at the collector of Q11 is sent to the high voltage circuit and the video amplifier circuit as a H blanking pulse.

o **Vertical Deflection Circuit**

The H sync pulse obtained at the collector of Q8 is sent through pin 11 of IC2 to the vertical (V) sync separator in IC2 where the V sync pulse is separated. The V sync pulse is fed to the V oscillator to trigger it and the V oscillator oscillates the V sawtooth signal. The V sawtooth signal is then fed through V deflection drive circuit in IC2 and pin 16 of IC2 to the V deflection coil. VR4 (V. SIZE) is a control for adjusting V scanning size.

15-4 High Voltage Circuit

This circuit generates high voltages for cathode ray tube (CRT) electrodes.

The flyback pulse generated at the collector of Q11 in the horizontal (H) deflection circuit is supplied to primary winding of the flyback transformer (FBT) in the high voltage pack T1 to step up the flyback pulse to necessary level.The boosted pulse obtained at the secondary winding of FBT are rectified to generate high voltages. +3.5kV obtained by rectifying the boosted pulse is fed to the CRT anode.+500V obtained at pin 6 of T1 is divided by VR8 (FOCUS) and R55~R59. The DC voltage set by VR8 is fed to grid-3 (G3) of CRT. +300V obtained at cross point of R57 and R59 is fed to grid-2 (G2) of CRT. +0.58V obtained at pin 7 of T1 is fed to heater of CRT through pin 3 of CN6. −65V obtained at pin 5 of T1 is sent to Q5 and Q7 as a power supply.

15-5 Indicator Drive Circuit

This circuit lights/blinks ON or OFF the Auto warning, battery warning, high gain indicator and the recording/tally indicator in front of cathode ray tube (CRT) screen by the control signals supplied to this circuit.

When the High Gain Selection Switch on the side of camera is set to the +9dB or +18dB position, the low level is sent to Q12 turning it ON and the high gain indicator D14 (b) on the LED board lights. When the DC voltage which is supplied to the camera from the battery becomes less than 10.6V, the pulse whose frequency is approximately 50Hz is fed to switching transistor Q14 to turn it ON and OFF. Therefore, the battery warning indicator D13 on the LED board blinks. When the automatic white balance and black balance is being set, the pulse whose frequency is approximately 5Hz is fed to switching transistor Q15 to turn it ON and OFF. Therefore, the auto indicator D12 on the LED board blinks. If the automatic white balance and black balance is set improperly, the 60Hz vertical scanning start (Vs) pulse is fed to Q15 and D12 lights ON. When the camera is set to the recording mode by pressing the VTR Start / Stop switch, low level is sent to Q16 and Q17 to turn them ON and the recording / tally indicator D11 on the LED board and the tally light D7 - D10 in front of viewfinder light. If the tally ON / OFF switch SW2 is set to the OFF position, D7 - D10 turns OFF.

Ⓝ 4, 8

Service Manual

PAL Colour Video Camera

WV-F200 Series

Vol. 2

Adjustment Procedures

CONTENTS

1. TEST EQUIPMENT REQUIRED 2-1
2. DISASSEMBLING PROCEDURE FOR ADJUSTMENT 2-1
    - 2-1 Camera 2-1
    - 2-2 1.5" Viewfinder WV-VF38 2-3
    - 2-3 Camera Adaptor 2-4
    - 2-4 12X Servo Control Zoom Lens J12X10BKRSM 2-4
3. PRISM & CCD ASSEMBLY REPLACEMENT 2-4
4. ADJUSTMENT PROCEDURE - 1 2-6
    - 4-1 Connection and Setting up for Adjustment 2-6
    - 4-2 Adjustment 2-7
        - Power Board Adjustment 2-8
        - Sync Board Adjustment 2-8
        - Encoder Board Adjustment 2-10
        - CCD Drive Board Adjustment 2-14
        - Preamplifier Board Adjustment 2-15
        - Process-1 Board Adjustment 2-16
        - Process-2 Board Adjustment 2-19
        - Detail Board Adjustment 2-21
        - Location of Test Points and Adjusting Controls 2-29
            - Power Board 2-29
            - Sync Board 2-29
            - Encoder Board 2-29
            - CCD Drive Board 2-29
            - Preamplifier Board 2-30
            - Process-1 Board 2-30
            - Process-2 Board 2-30
            - Detail Board 2-30
            - Shading Board 2-31
            - Auto Board 2-31
            - Mother Board 2-31
            - Camera Adaptor 2-32
            - 1.5" Electronic Viewfinder WV-VF38 2-32
            - 12X Servo Control Zoom Lens J12X10BKRSM 2-32
        - Shading Board Adjustment 2-33
        - Auto Board Adjustment 2-33
    - 4-3 1.5" Electronic Viewfinder WV-VF38 Adjustment 2-34
    - 4-4 Camera Adaptor Adjustment 2-36
    - 4-5 12X Servo Control Zoom Lens J12X10BKRSM Adjustment 2-37
5. ADJUSTMENT PROCEDURE - 2 2-38
6. CHIP COMPONENTS 2-40

Adjustment Procedure

1. TEST EQUIPMENT REQUIRED

Following equipments are required for adjustment of WV-F200.

- Test signal generator or special effects generator (Black burst output)
- Waveform monitor
- Vectorscope (with SC/H phase range)
- Oscilloscope (Dual trace, More than 50MHz bandwidth, Delayed sweep)
- Digital voltmeter
- Frequency counter
- Monochrome underscanned video monitor (more than 800 lines resolution)
- Color video monitor
- Logarithmic gray scale chart (YWV2310RB99)
- Color chart (YWV2100RB98)
- In-mega cycle chart (YFINMEGA-K)
- Resolution chart (YWV1400RB99)
- Resistration/White set chart (YFV8RA0011A3)
- AC adaptor (WV-PS31) or DC power supply (DC 12V, 3A or more)
- Lighting (200 footcandles (2000 lux), 3200°K)
- Lux meter
- Tripod
- Tripod mounting adaptor (WV-Q47)
- 12X power zoom lens (J12X10BKRSM)
- Camera adaptor
- Extension boards (YWVKZ0Q95P1A, YWVAKA0585AN)
- Extension cable (YWVAKA0584AN)

2. DISASSEMBLING PROCEDURE FOR ADJUSTMENT

2-1 Camera

2-1-1 Side Cover

- Loosen four screws which hold the side cover and remove the side cover.

(A) For left side cover (viewed from the front)

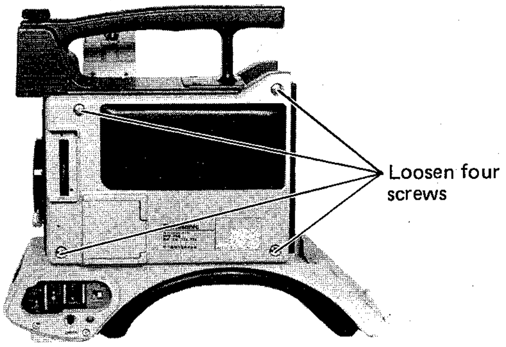


Fig. 2-1-1

(B) For right side cover (viewed from the front)

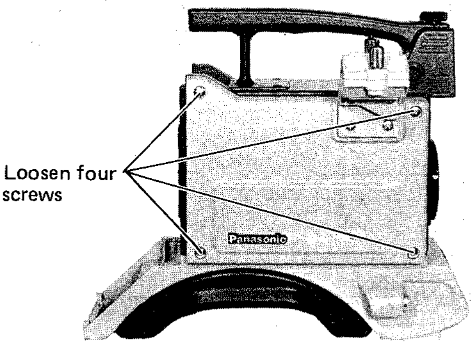


Fig. 2-1-2

2-1-2 Preamplifier Board

- Loosen four screws which hold the right side cover and remove the right side cover as shown in Fig. 2-1-2.
- Remove four screws which hold the shield cover (M18) on the Preamplifier board and remove the shield cover.

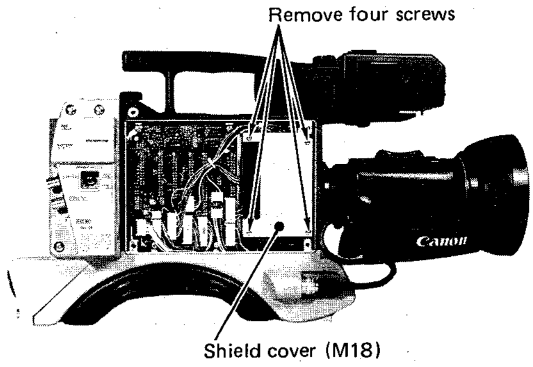


Fig. 2-1-3

- Remove four screws which hold the Preamplifier board and pull it out forward while holding the bottom portion of the Preamplifier board.

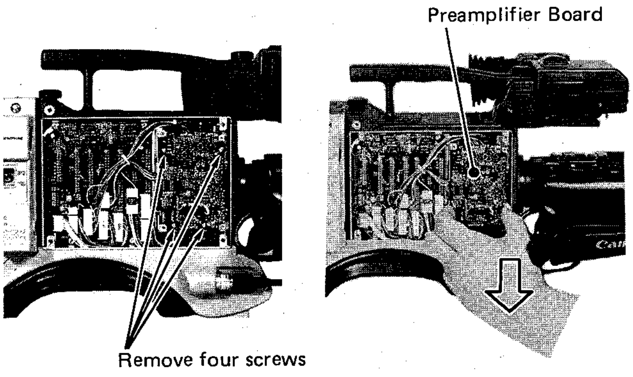


Fig. 2-1-4

- When adjusting or servicing the Preamplifier board, use the extension cable (YWVAKA0584AN) as shown on page 2-7.

2-1-3 CCD Drive Board

- Remove both side cover from camera as shown in Fig. 2-1-1 and Fig. 2-1-2.
- Disassemble the Preamplifier board while referring to 2-1-2. Preamplifier Board.
- Remove two screws which hold the mounting plate (M14) to the optical chassis (M2).

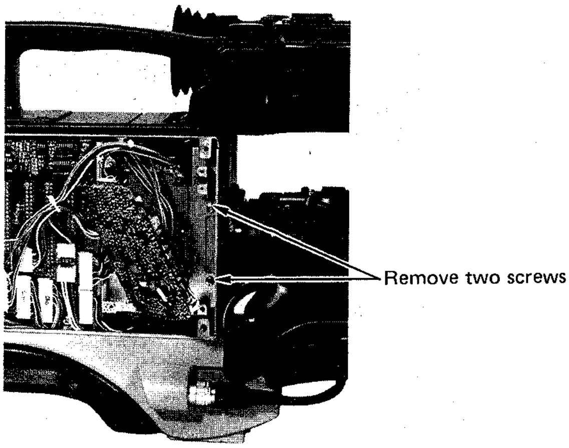

Remove two screws

Fig. 2-1-5

- Remove seven boards (Process-1, Process-2, Auto, Detail, Encoder, Sync and Power boards) together with five barriers (M79) from camera.

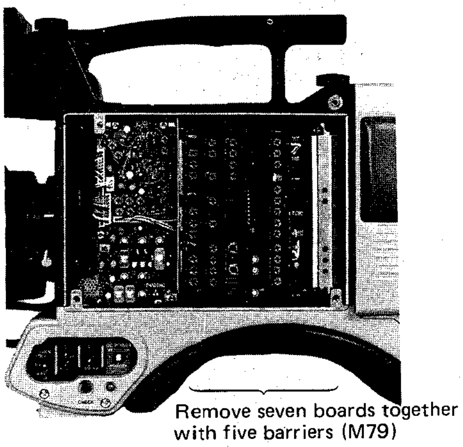

Remove seven boards together with five barriers (M79)

Fig. 2-1-6

- Remove two screws which fix the Prism & CCD assembly and the mounting plate (M14). (Fig. 2-1-7)
- Remove a screw which hold the barrier (M78) for Prism & CCD assembly and remove the barrier by pulling it forward. (Fig. 2-1-7)
- Remove four screws which hold the Shading board and remove the Shading board. (Fig. 2-1-7)

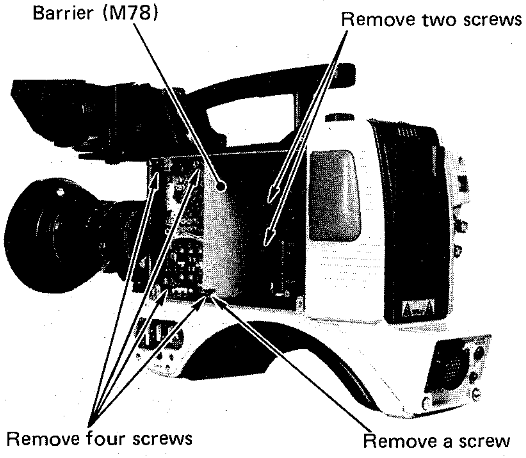

Barrier (M78)
Remove two screws
Remove four screws
Remove a screw

Fig. 2-1-7

- Remove two screws which hold the shield parts (M17) and remove the shield parts.

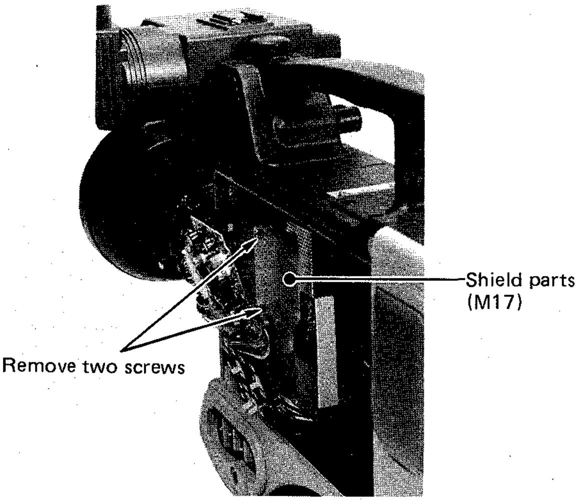

Shield parts (M17)
Remove two screws

Fig. 2-1-8

- Disconnect CN1 on the CCD Drive board by pulling the latch forward.

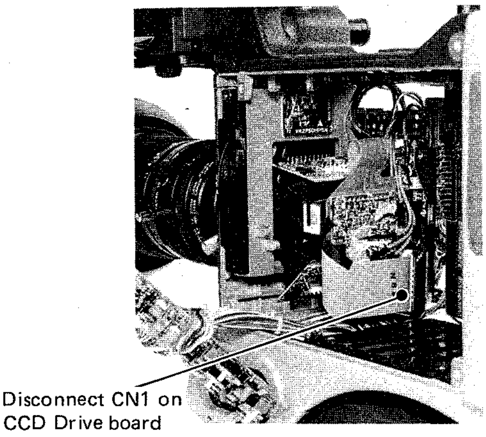

Disconnect CN1 on CCD Drive board

Fig. 2-1-9

- Disconnect CN2 on the CCD Drive board.

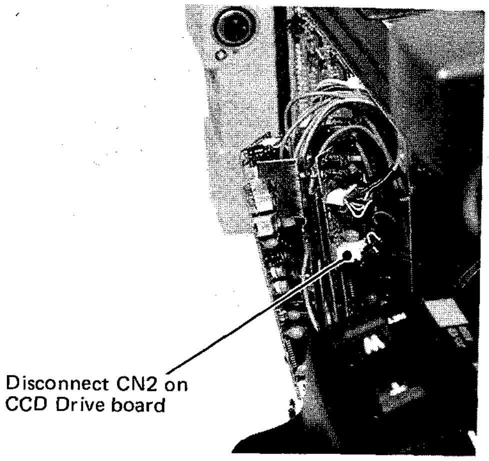

Disconnect CN2 on
CCD Drive board

Fig. 2-1-10

- Remove three screws which hold the CCD Drive board to the mounting plate (M14) and remove the mounting plate.

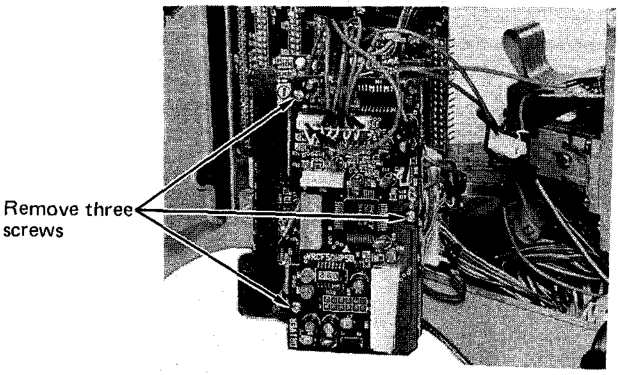

Remove three screws

Fig. 2-1-11

- When adjusting or servicing the CCD Drive board, use the extension board (YWVAKA0585AN).

2-2 1.5" Viewfinder WV-VF38

- Remove the rubber eye cap from the viewfinder by pulling while lifting the center portion of eye cap.

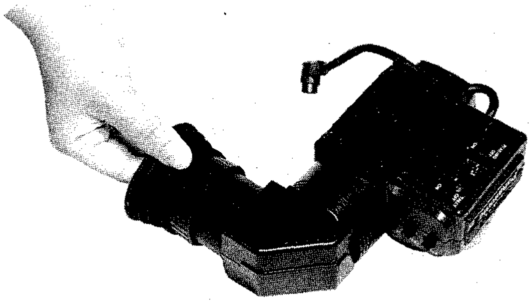


Fig. 2-2-1

Remove the stopper spring for viewfinder optical diopter adjuster and remove the adjuster by pulling counterclockwise.

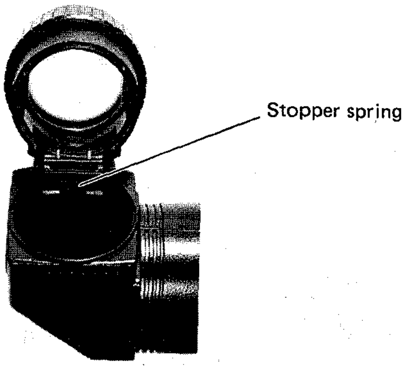

Stopper spring

Fig. 2-2-2

- Remove one screw which hold the CRT upper cover and remove the CRT upper cover.

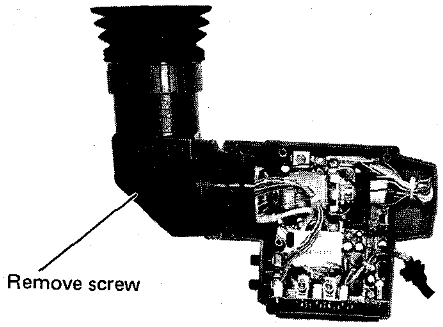

Remove screw

Fig. 2-2-3

- Remove four screws which hold the EVF lower cover and remove the EVF lower cover by pulling it.

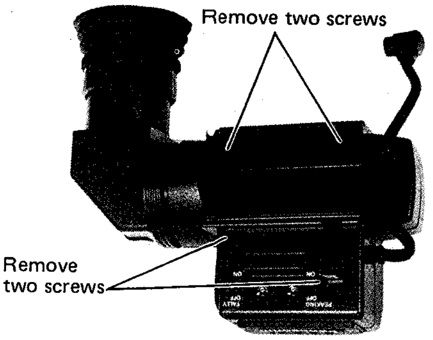

Remove two screws
Remove two screws

Fig. 2-2-4

2-3 Camera Adaptor

- Remove nine screws which hold the upper, rear and bottom covers and remove them.

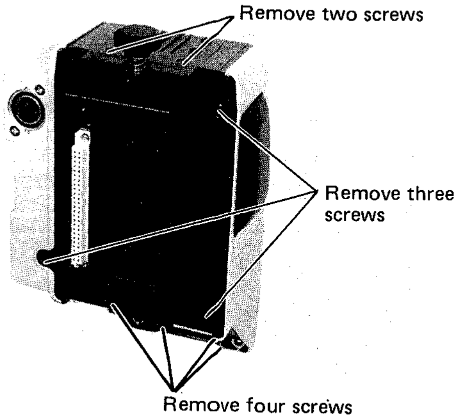

Remove two screws
Remove three screws
Remove four screws

Fig. 2-3-1

2-4 12X Servo Control Zoom Lens J12X10BKRSM

- Remove six screws which hold the main cover and remove the main cover.

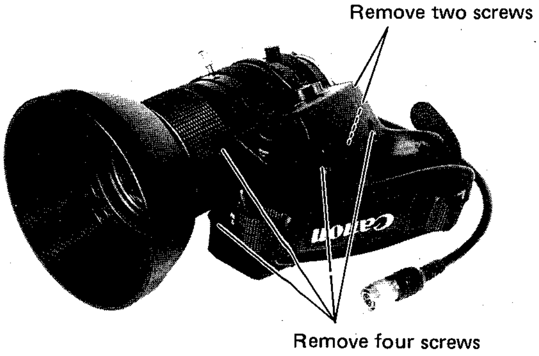

Remove two screws
Remove four screws

Fig. 2-4-1

- Remove two screws which hold the Drive Amp board and remove the Drive Amp board.

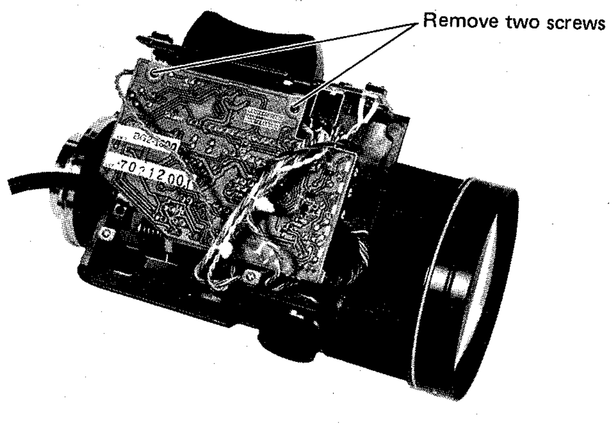

Remove two screws

Fig. 2-4-2

3. Prism & CCD Assembly Replacement

- Disassemble the camera while referring to 2 Disassembling Procedure for Adjustment on page 2-1.
- Disconnect the lens connector from the camera.
- Remove the lens from the camera by turning the lens holding ring/knob counterclockwise.
- Remove six screws which hold the lens mount assembly and remove the lens mount assembly.

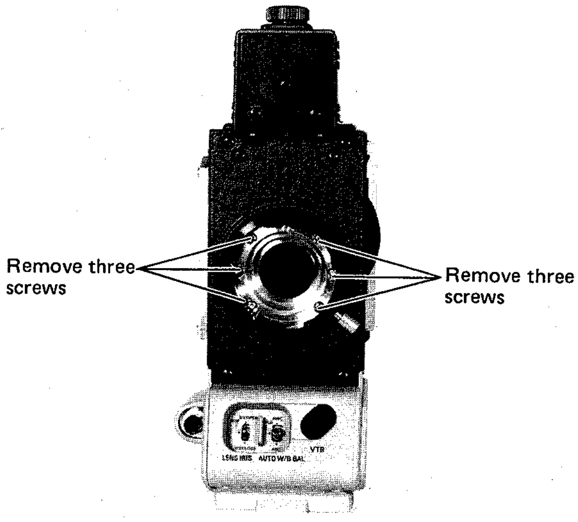

Remove three screws
Remove three screws

Fig. 3-1

- Remove eight screws which hold the front panel and remove the front panel.

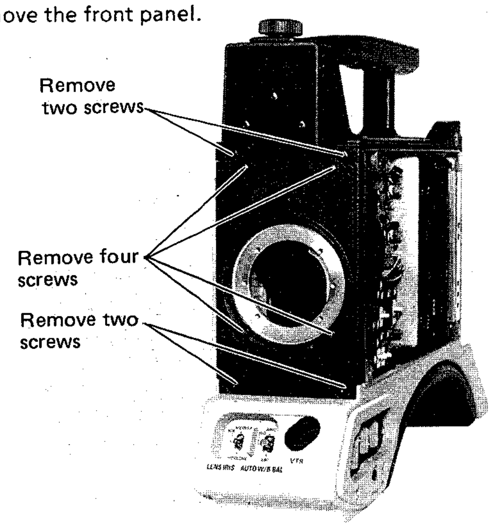

Remove two screws
Remove four screws
Remove two screws

Fig. 3-2

- Remove two screws which hold the filter assembly and remove the filter assembly.

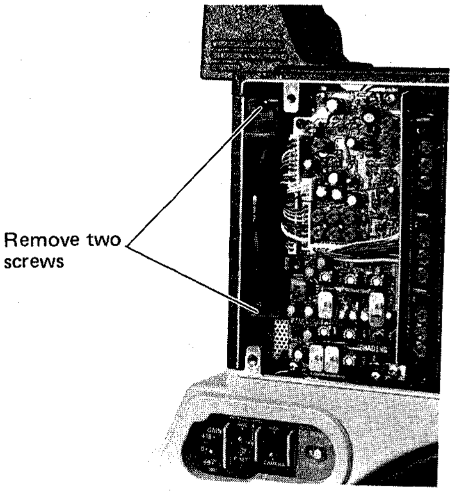

Remove two screws

Fig. 3-3

- Remove four screws which hold the shield cover and remove the shield cover.

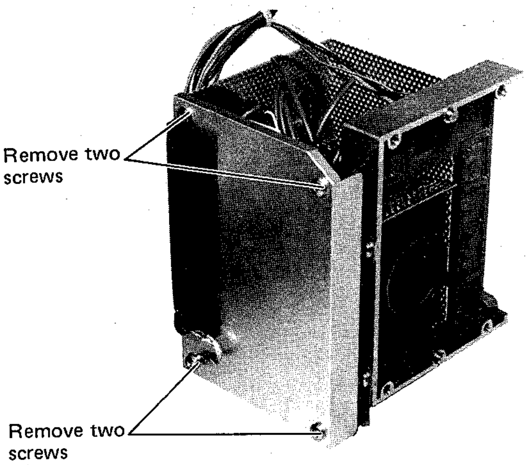

Remove two screws
Remove two screws

Fig. 3-4

- Remove four screws which hold the shield case and remove the shield case.

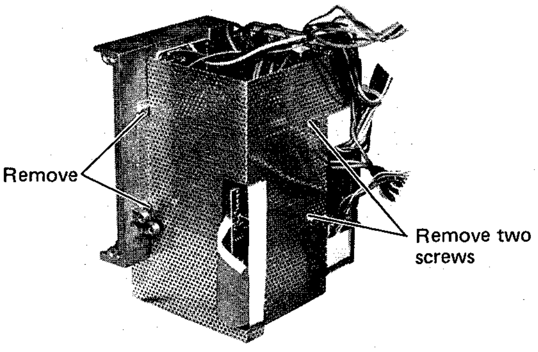

Remove
Remove two screws

Fig. 3-5

- Remove two screws which hold the prism & CCD assembly and remove the prism & CCD assembly.

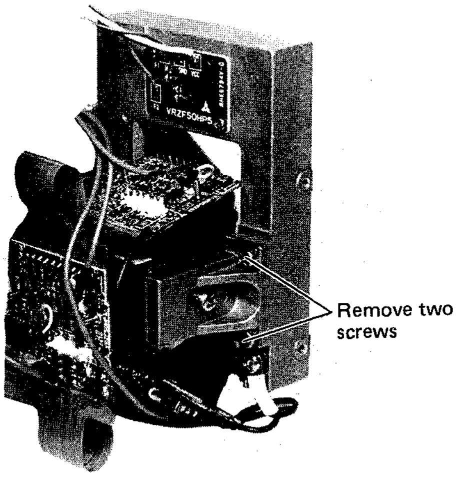

Remove two screws

Fig. 3-6

- After replacing the prism & CCD, assembly the camera in the reverse order of disassembly.
- IC10 on the CCD drive board is used for spot correction of CCD image sensor. When replacing prism & CCD assy, refer to the following.
  1) In case of IC10 is enclosed with replacement prism & CCD assy.
     ---- replace both IC10 and prism & CCD assy.
  2) In case of IC10 is not enclosed with prism & CCD assy.
     ---- replace prism & CCD assy only.

4. ADJUSTMENT PROCEDURE-1

4-1 Connection and Setting Up for Adjustment

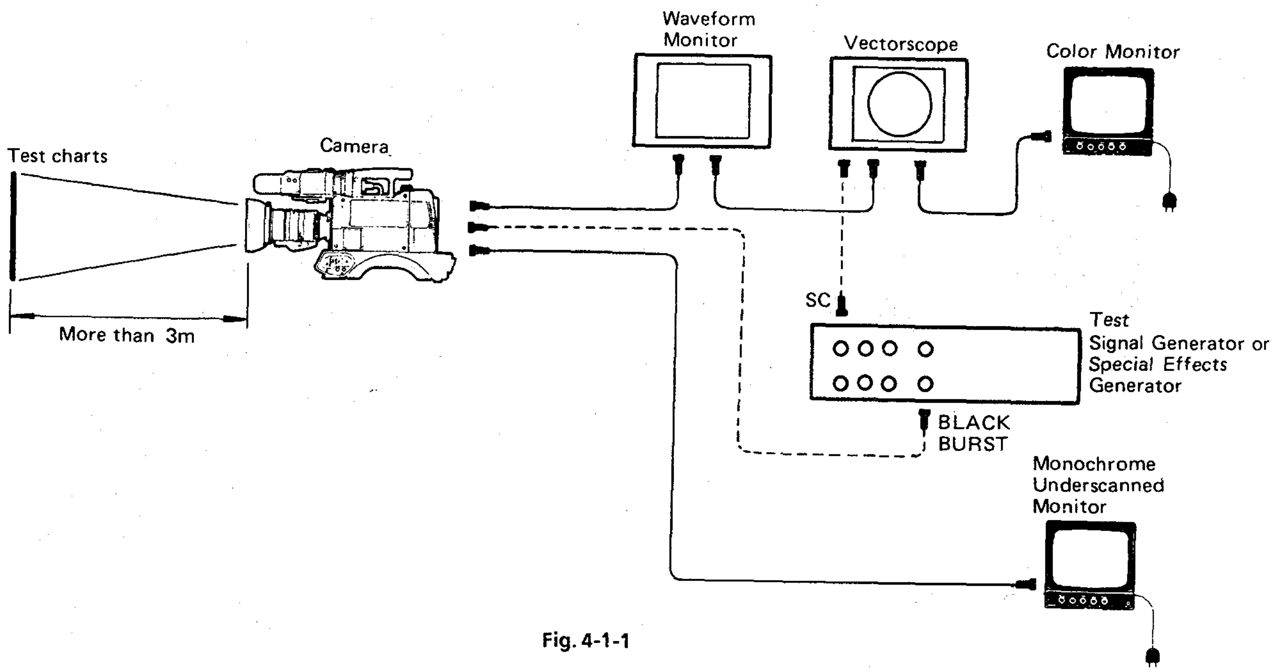

Waveform Monitor
Vectorscope
Color Monitor
Test charts
Camera
More than 3m
SC
Test Signal Generator or Special Effects Generator
BLACK BURST
Monochrome Underscanned Monitor

Fig. 4-1-1

Connection

- Connect the coaxial cable between the VIDEO OUT connector on the right side (viewed from rear) of camera adaptor and the VIDEO IN connector of the vectorscope.
- Connect the coaxial cable between the VIDEO OUT connector of the vectorscope and the VIDEO IN connector of the waveform monitor.
- Terminate the video input of the waveform monitor with 75 ohms.
- Connect the coaxial cable between the VIDEO OUT connector of the waveform monitor and the video input of the color video monitor.
- Connect the coaxial cable between the VIDEO OUT connector of the color video monitor and the video input of the underscanned black and white video monitor.
- Terminate the video input of the underscanned black and white video monitor with 75 ohms.

Setup

- Turn on the camera for warm up at least 30 minutes prior to adjustment.
- Distance between the camera and test chart should be 3m.
- Lighting: 200 footcandles (2000 lux), incident, 3200°K.

Position of Controls and Switches on the Camera

(Left Side) Viewed from rear

• Filter Wheel	1
• High Gain Selection Switch	0 dB
• Color Bar/Camera Selection Switch	CAMERA
• White Balance Selection Switch	P SET
• Power Switch	ON

(Inside Setup Panel)

• T PED	Center
• R GAIN	Center
• B GAIN	Center
• Detail Level Selection Switch	OFF
• H PHASE	Center
• SC PHASE	Center
• Lens Iris Control	11 o'clock
• Level Indicator ON/OFF Switch	ON

(Front)

• Auto White/Auto Black Set Switch	HOLD
• Lens Iris Selection Switch	NOR

(Right Side) Viewed from rear

• Power Selector Switch	BATT/EXT DC

(Lens)

• Iris Control Selection Switch	M (Manual)
• Servo/Manual Zoom Selection Switch	MANU

4-2 Adjustment

- Refer to the LOCATION OF TEST POINTS AND ADJUSTING CONTROLS.
- Aim the camera at the test chart so that the arrow heads on the test chart just touch to the four edges of the raster on the underscanned video monitor.

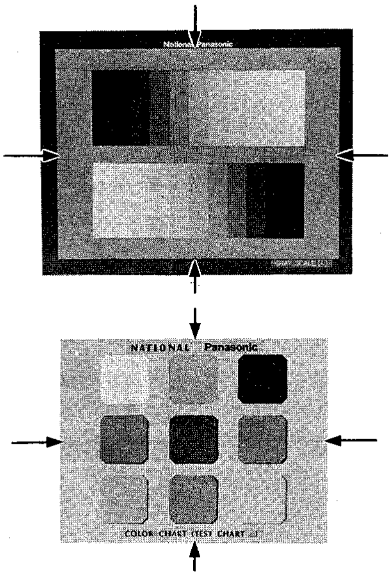

National Panasonic
GRAY SCALE
NATIONAL Panasonic
COLOR CHART (TEST CHART)

Fig. 4-2-1

■ Extension Board

- When adjusting the Process-1, Process-2, Auto, Detail, Encoder, Sync and Power board, use the following extension board. (YWVKZ0Q95P1A)

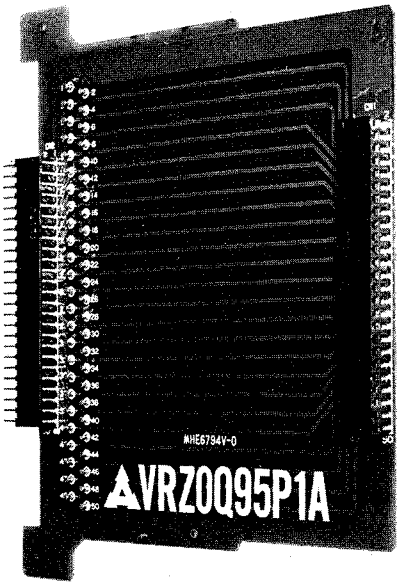

HE6794V-0
AVRZ0Q95P1A

Fig. 4-2-2

- When adjusting the CCD Drive board, use the following extension board (YWVAKA0585AN).

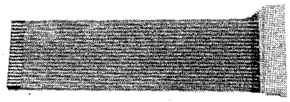


Fig. 4-2-3

- This extension board can be able to extend between CN1 on CCD & Prism Assembly and CN1 on CCD Drive board as follows.

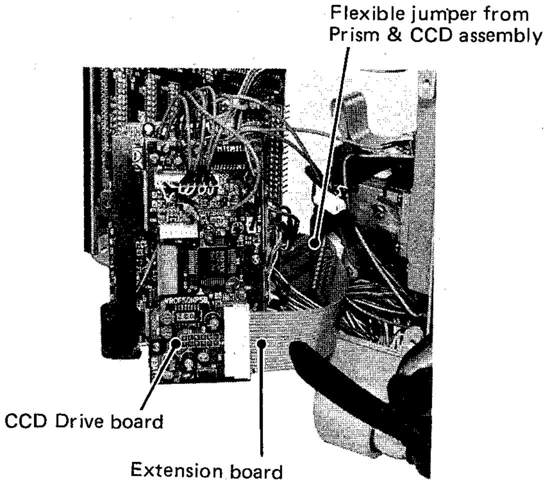

Flexible jumper from Prism & CCD assembly
CCD Drive board
Extension board

Fig. 4-2-4

■ Extension Cable

- When adjusting the Preamplifier board, use the following extension cable (YWVAKA0584AN)

Fig. 4-2-5

- This extension cable can be able to extend between CN1 on Preamplifier board and CN3 on CCD Drive board as follows.

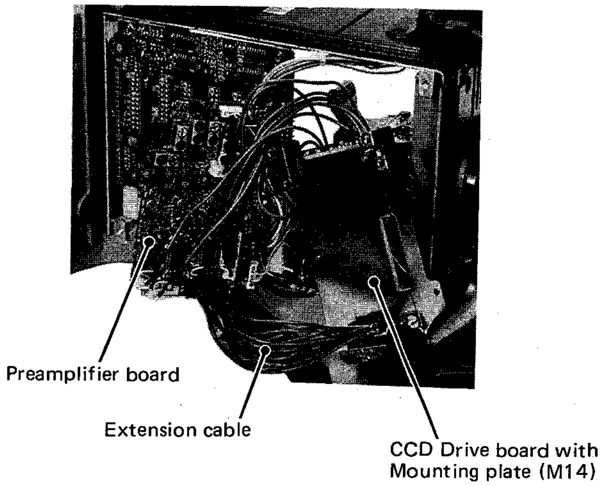

Preamplifier board
Extension cable
CCD Drive board with Mounting plate (M14)

Fig. 4-2-6

■ Power Board Adjustment

(1) Power board adjustment

Test points:	TP1 (+9.2V)	Mother board
	TP2 (+5.1V)	Mother board
	TP3 (−4.8V)	Mother board
	TP4 (−8V)	Mother board
	TP5 (+20.9V)	Mother board
Adjusts:	VR1 (+9.2V ADJ)	Power board
	VR3 (+5.1V ADJ)	Power board
	VR4 (+20.9V ADJ)	Power board
	VR5(−8V ADJ)	Power board
	VR6 (−4.8V ADJ)	Power board

- Connect the digital voltmeter to TP1.
- Adjust VR1 for 9.2V ± 0.02V.
- Connect the digital voltmeter to TP2.
- Adjust VR3 for 5.1V ± 0.02V.
- Connect the digital voltmeter to TP3.
- Adjust VR6 for −4.8V ± 0.02V.
- Connect the digital voltmeter to TP4.
- Adjust VR5 for −8V ± 0.05V.
- Connect the digital voltmeter to TP5.
- Adjust VR4 for 20.9V ± 0.05V.

■ SYNC Board Adjustment

(2) Internal subcarrier adjustment

Test point:	TP15 (SC)	Sync board
Adjust:	CT1 (INT SC)	Sync board

- Connect the frequency counter to TP5.
- Adjust CT1 for 4.43361875MHz ± 2Hz.

(3) Interleaving adjustment

Test point:	Capacitor C105	Sync board
Adjust:	CT1 (INTERLEAVING)	Sync board

- Connect the oscilloscope to C105.
- Adjust CT1 so that the DC voltage becomes 2.5V ± 0.2V.

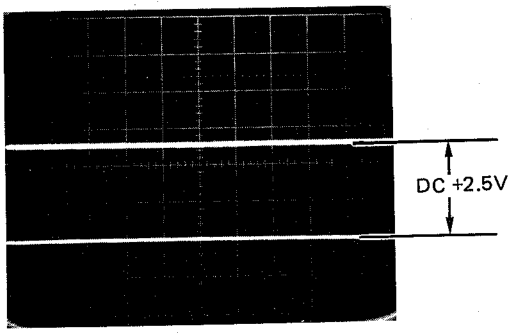


Fig. 4-2-7

(4) Clamp pulse adjustment

Test points:	Pin 22 (Composite Sync) of Extension board	
	Pin 26 (CP) of Extension board	
Adjusts:	VR6 (CP WIDTH)	Sync board
	VR7 (CP PHASE)	Sync board

- Connect the 2 probes of the oscilloscope to pins 22 and 26 of Extension board.
- Trigger the oscilloscope at H rate with using TP7 (HD) on the Mother board.
- Set the oscilloscope to H rate and dual display.
- Adjust VR7 so that the CP signal delay 2.1 µs ± 0.1 µsec from Composite Sync signal.
- Adjust VR6 so that CP width becomes 2.2 µsec ± 0.1 µsec.

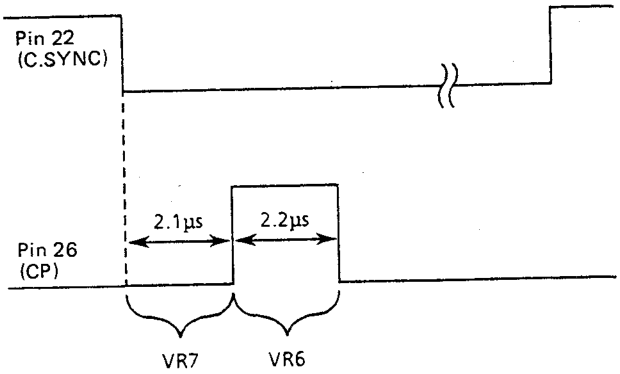


Fig. 4-2-8

(5) H/V Pre blanking width adjustment

Test point:	Pin 22 (Composite Sync) of Extension board	
	Pin 13 (C.PRE BL) of Extension board	
Adjust:	VR8 (V PRE BL WIDTH)	Sync board
	VR9 (H PRE BL WIDTH)	Sync board

- Connect the 2 probes of the oscilloscope to pins 22 and 13 of Extension board.
- Trigger the oscilloscope at H rate with using TP7 (HD) on the Mother board.
- Set the oscilloscope to H rate and dual display.
- Expand the H.Pre blanking period on the oscilloscope.
- Adjust VR9 so that H pre blanking width becomes 11.1 µsec ± 0.1 µsec.

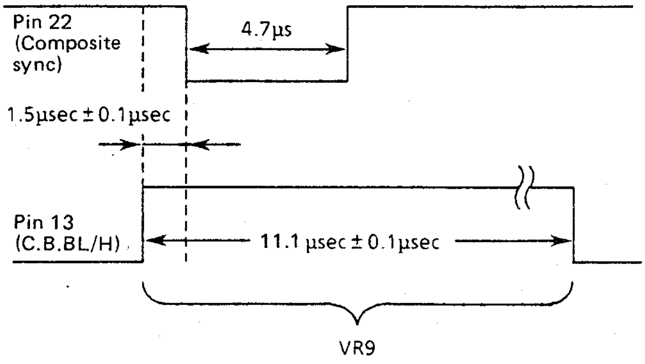

Pin 22
(Composite
sync)
4.7µs
1.5µsec ± 0.1µsec
Pin 13
(C.B.BL/H)
11.1 µsec ± 0.1µsec
VR9

Fig. 4-2-9

- Trigger the oscilloscope at V rate with using TP6 (VD) on the Mother board and set it to V rate.
- Adjust VR8 so that V. pre blanking becomes 22H.

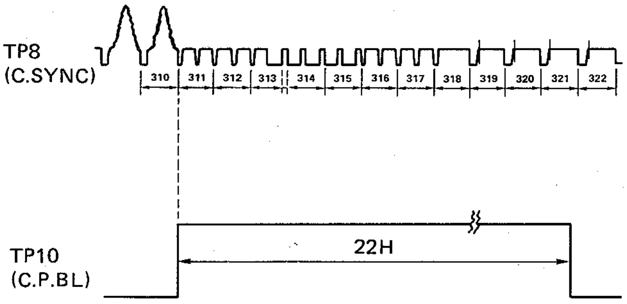

TP8
(C.SYNC)
310
311
312
313
314
315
316
317
318
319
320
321
322
TP10
(C.P.BL)
22H

Fig. 4-2-10

(6) Vertical clamp pulse adjustment

Test point:	Pin 22 (Composite Sync) of Extension board	
	Pin 14 (V.CP) of Extension board	
Adjust:	VR4 (V.CP WIDTH)	Sync board
	VR5 (V.CP PHASE)	Sync board

- Connect 2 probes of the oscilloscope to pins 22 and 14 of Extension board.
- Trigger the oscilloscope at V rate with using TP6 (VD) on the Mother board.
- Set the oscilloscope to V rate and dual display.
- Adjust VR5 so that Ⓐ becomes 2.5H ± 1 µsec.
- Adjust VR4 so that Ⓑ becomes 2.5H ± 1 µsec.

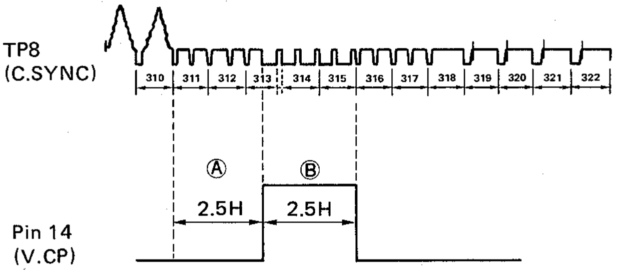

TP8
(C.SYNC)
310
311
312
313
314
315
316
317
318
319
320
321
322
Ⓐ
Ⓑ
2.5H
2.5H
Pin 14
(V.CP)

Fig. 4-2-11

(7) H. phase adjustment

Test points:	TP1 (G/L VIDEO)	SYNC board
	VIDEO OUT Connector	
Adjusts:	VR15 (H PHASE)	Shading board

- Supply the black burst signal or color bar signal to the GEN-LOCK Input connector on the camera adaptor from the Test Signal Generator or S.E.G.
- Connect the 2 probes of the oscilloscope to TP1 and VIDEO OUT Connector.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Set the oscilloscope to H rate and dual display.
- Expand the H sync period on the oscilloscope.

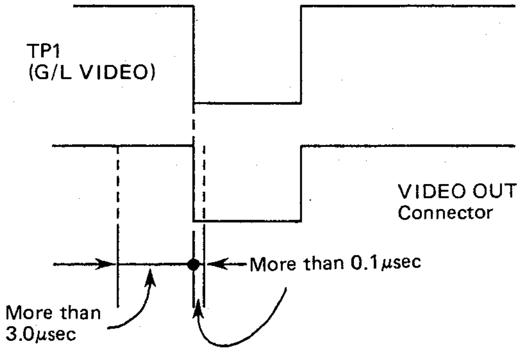

TP1
(G/L VIDEO)
VIDEO OUT
Connector
More than 0.1µsec
More than
3.0µsec

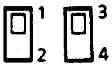
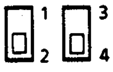
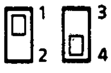
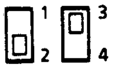
Fig. 4-2-12

- Confirm that the sync of gen-lock signal at TP1 leads by more than 0.1 µsec and lags more than 3.0 µsec sync signal at VIDEO OUT connector when turning VR15.
- Reset the H PHASE control inside setup panel to its mechanical center.

(8) Confirmation of subcarrier phase

Adjusts :	VR16 (SC PHASE)	Shading board
	SW5 (SC PHASE-1 SWITCH)	Shading board
	SW6 (SC PHASE-2 SWITCH)	Shading board
Observe :	Vectorscope	

- Supply the black burst signal or color bar signal to the GEN-LOCK Input connector on the camera adaptor from the Test Signal Generator or S.E.G.
- Supply an external subcarrier signal to the external subcarrier reference (EXT CW øREF) connector of the vectorscope from the Test Signal Generator or S.E.G.
- Set the burst mode (øREF) of the vectorscope to EXT position.
- Set SW5 and SW6 to 0° position.
- Confirm that the burst phase changes more than 90°, 180° and 270° when SW5 and SW6 are set to 90°, 180° and 270° position.
- Confirm that the burst phase changes more than 90°, when VR16 is turned back.
  (The burst phase changes more than 360° by setting SW5, SW6 and VR16.)

Subcarrier Phase	0°	90°	180°	270°
Position of Switches				

- Reset SW5 and SW6 to 0° position and return VR16 to its mechanical center.
- Disconnect the black burst signal or color bar signal from the GEN-LOCK Input connector, and the external subcarrier signal from the vectorscope.

■ Encoder Board Adjustment

(9) Color bar adjustment

Test point :	VIDEO OUT connector	
Adjusts :	VR1(BAR START)	Encoder board
	CT1 (BAR WIDTH)	Encoder board
Observe :	Waveform monitor	

- Confirm that the Color Bar/Camera Selection Switch is set to BAR position.
- Set the SW1 (V ON/OFF SWITCH) and SW2 (U ON/OFF SWITCH) on Encoder board to ON position.
- Adjust VR1 so that the rising edge of the white bar coincides with the end of horizontal blanking on the waveform monitor and the end of blue bar coincides with the beginning of the horizontal blanking on the waveform monitor.
- Adjust CT1 so that the width of black bar portion becomes 6.2 µsec.

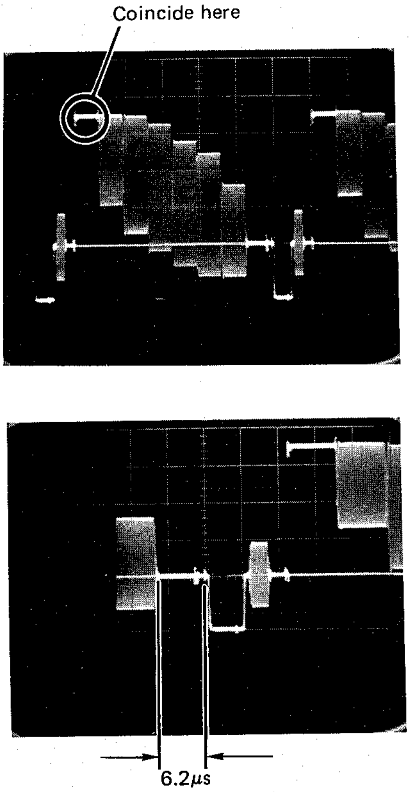


Fig. 4-2-13

(10) U/V black balance/white balance adjustment

Test point :	VIDEO OUT connector	
Adjusts :	VR5 (V CARRIER BAL)	Encoder board
	VR6 (U CARRIER BAL)	Encoder board
	VR4 (V WHITE BAL)	Encoder baord
	VR7 (U WHITE BAL)	Encoder board
	VR9 (V CAN)	Encoder baord
	VR10 (U CAN)	Encoder board
Observe :	Waveform monitor	
	Vectorscope	

- Confirm that the Color Bar/Camera Selection Switch is set to BAR position.
- Set the SW1 (V ON/OFF SWITCH) and SW2 (U ON/OFF SWITCH) on Encoder board to ON position.
- Adjust VR5 and VR6 alternately so that the carrier on the black level becomes minimum.

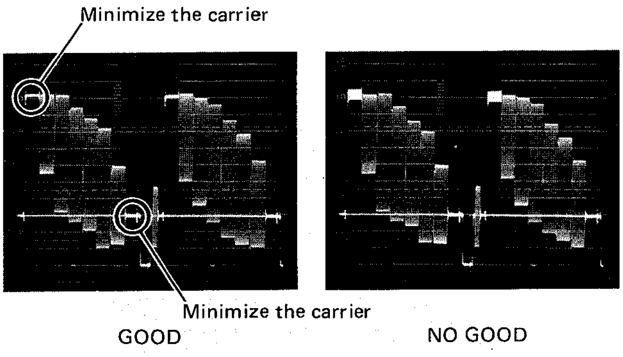


Fig. 4-2-14

- Adjust VR9 and VR10 alternately so that the vector positions at the center of the vectorscope.

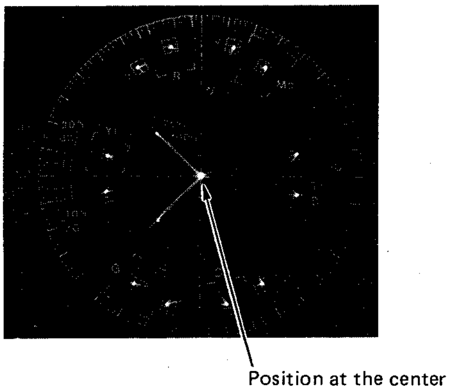


Fig. 4-2-15

- Adjust VR4 and VR7 alternately so that the carrier on the white level becomes minimum. (Fig. 4-2-14)

(11) Bar pedestal and sync level adjustment

Test point :	VIDEO OUT connector	
Adjusts :	VR2 (BAR SETUP)	Encoder board
	VR14 (SYNC LEVEL)	Encoder board
Observe :	Waveform monitor	
	Vectorscope	

- Adjust VR2 so that the setup level (black level) becomes 0V ± 7mV.
- Adjust VR14 so that the sync level becomes 0.3V ± 7mV.

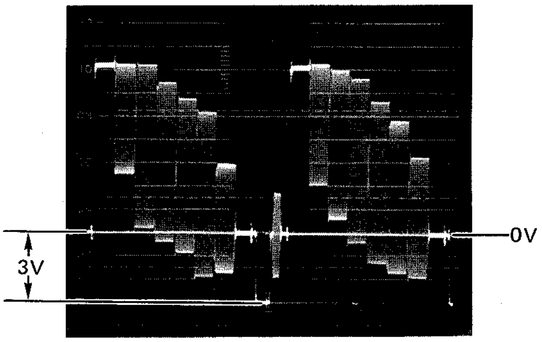


Fig. 4-2-16

(12) Y gain adjustment

Test point :	VIDEO OUT connector	
Adjust :	VR17 (Y GAIN)	Encoder board
Observe :	Waveform monitor	
	Vectorscope	

- Adjust VR17 so that the gray bar signal level becomes 0.7V ± 7mV.

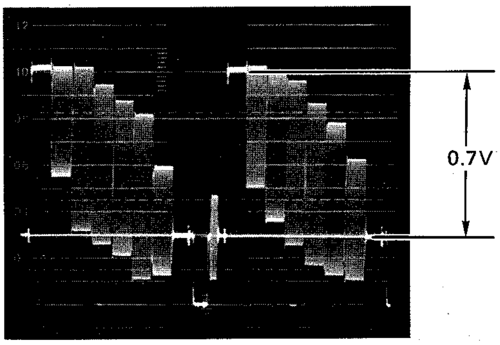


Fig. 4-2-17

(13) Chroma adjustment

Test point :	VIDEO OUT connector	
Adjusts :	VR16 (QUAD)	Encoder board
	VR8 (SUB-QUAD)	Encoder board
	VR18 (V LEVEL)	Encoder board
	VR15 (CHROMA GAIN)	Encoder board
	CT2 (CHROMA FREQ.)	Encoder board
	VR12 (BURST PHASE)	Encoder board
	VR11 (BURST GAIN)	Encoder board
Observe :	Vectorscope	

- Adjust CT2 so that the all vectors become maximum on the vectorscope.
- While changing the SW1 (V ON/OFF SWITCH) and SW2 (U ON/OFF SWITCH) between V-ON/OFF and U-OFF/ON position alternately, adjust VR16 and VR8 so that the U and V vectors become 90° each other.

  Note : For this adjustment, disregard the burst phase and level.
- Set the SW1 and SW2 to OFF position.
- Adjust VR15 and VR18 so that all vectors fall into their respective boxes.

  When necessary, fine-adjust VR16 (QUAD) and VR8 (SUB-QUAD) together with VR15 and VR18.
- Adjust VR12 so that the phase difference between the burst vectors for odd and even line is 90° on the vectorscope.
- Adjust VR11 so that the burst vector becomes 75% position on the 135° and 225° axis.

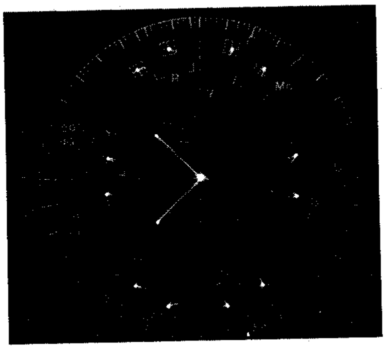


Fig. 4-2-18

- Repeat above steps so that all vectors fall into their respective boxes.

(14) Camera pedestal adjustment

Test point :	VIDEO OUT connector	
Adjust :	VR3 (CAMERA SETUP)	Encoder board
Observe :	Waveform monitor	

- Set the Color Bar/Camera Selection Switch to Camera position.
- Turn VR12 (TOTAL PEDESTAL) on the Shading board fully counterclockwise.
- Adjust VR3 so that pedestal level becomes 0 V.
- Set VR12 to its mechanical center.

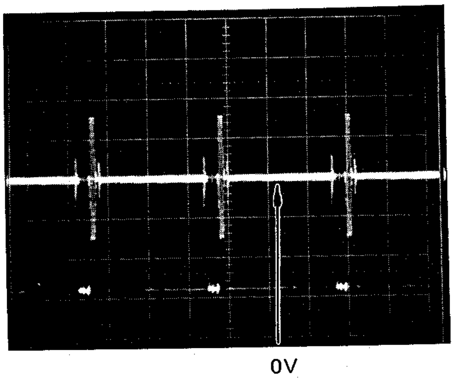


Fig. 4-2-19

(15) SC/H phase adjustment

Test point:	VIDEO OUT connector	
Adjusts :	VR10 (SC/H)	Sync board
Observe :	Vectorscope with SC/H phase range	

- Set the BAR/CAMERA selection switch to BAR position.
- Set the vectorscope to SC/H position.
- Adjust VR10 so that the SC/H phase becomes 0° ± 10°.

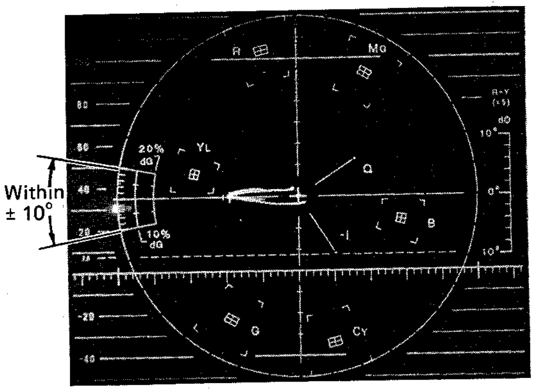


Fig. 4-2-20

(16) Third field adjustment

Test points :	TP1 (G / L)	Sync board
	TP3 (FIELD ADJ)	Sync board
Adjust :	VR11 (FIELD ADJ)	Sync board

- Supply the black burst signal or color bar signal to GEN-LOCK input connector on the camera adaptor from Test signal generator.
- Connect 2 probes of the oscilloscope to TP1 and TP3.
- Trigger the oscilloscope at V rate with using TP6 (VD) on the Mother board.
- Set the oscilloscope to V rate and dual display.
- Expand the A portion of third field signal on the oscilloscope.

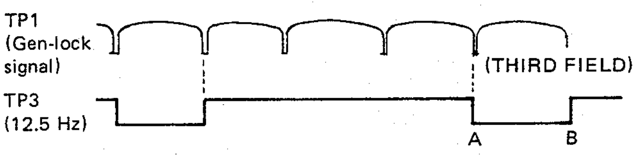

TP1
(Gen-lock
signal)
(THIRD FIELD)
TP3
(12.5 Hz)
A
B

Fig. 4-2-21 (a)

- Adjust VR11 so that the burst signal on the third field signal is gated by the gate pulse at TP3.

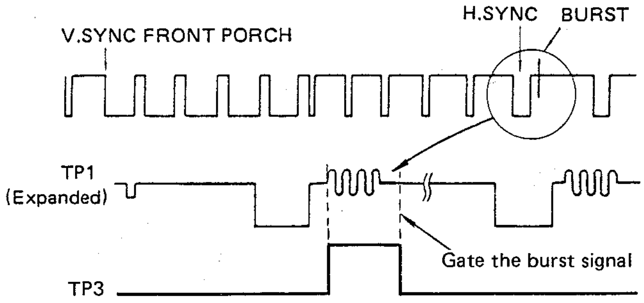

H.SYNC
BURST
V.SYNC FRONT PORCH
TP1
(Expanded)
Gate the burst signal
TP3

Fig. 4-2-21 (b)

- Relation of four fields signals and gate signal (TP3) is shown belowe.

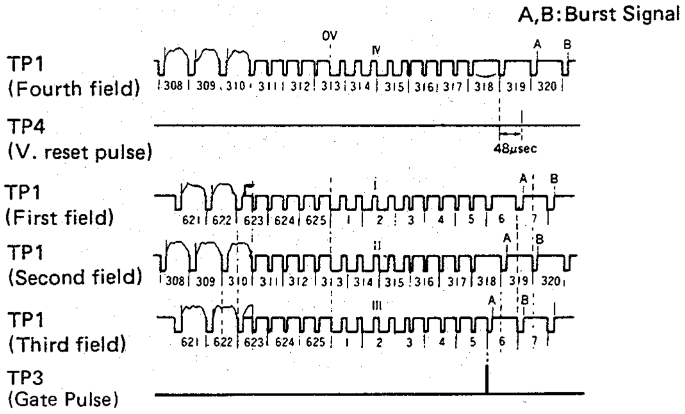

A,B: Burst Signal
0V
IV
A
B
TP1
(Fourth field)
308 309 310 311 312 313 314 315 316 317 318 319 320
TP4
(V. reset pulse)
48μsec
TP1
(First field)
621 622 623 624 625 1 2 3 4 5 6 7
I
TP1
(Second field)
308 309 310 311 312 313 314 315 316 317 318 319 320
II
TP1
(Third field)
621 622 623 624 625 1 2 3 4 5 6 7
III
TP3
(Gate Pulse)

Fig. 4-2-21 (c)

(17) Horizontal lock adjustment

Test point :	Pin 1 of IC19	Sync board
Adjust :	CT2 (H LOCK)	Sync board

- Supply the black burst signal or color bar signal to GEN-LOCK input connector on the camera adaptor from Test signal generator.
- Connect the oscilloscope to pin 1 of IC19.
- Adjust CT2 so that the DC voltage becomes 2.5V ± 0.1V.

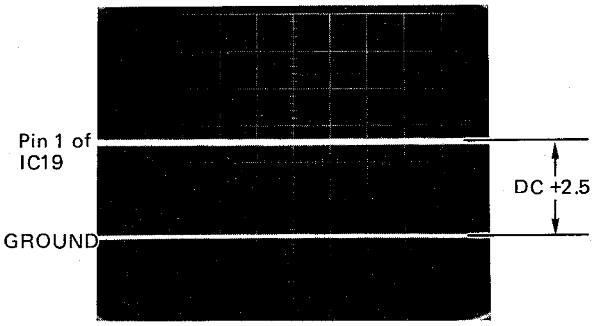

Pin 1 of
IC19
DC +2.5V
GROUND

Fig. 4-2-22

(18) Color lock adjustment

Test point :	Pin 1 of IC31	Sync board
Adjust :	CT3 (COLOR LOCK)	Sync board

- Supply the black burst signal or color bar signal to GEN-LOCK input connector on the camera adaptor from Test signal generator.
- Connect the oscilloscope to pin 1 of IC31.
- Adjust CT3 so that the DC voltage becomes 2.5V ± 0.1V.

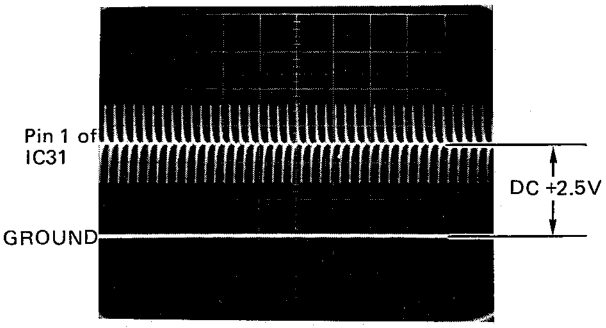

Pin 1 of
IC31
DC +2.5V
GROUND

Fig. 4-2-23

(19) Reset timing adjustment

Test point :	Pin11 of IC32	Sync board
	Pin 17 of Extension board	
Adjust :	VR2 (RESET TIMING)	Sync board
Observe :	Oscilloscope	

- Connect the oscilloscope to pin11 of IC32 on Sync board and pin 17 of Extension board.
- Trigger the oscilloscope at H rate with using TP7 on the Mother board.
- Turn VR12 to following position first.

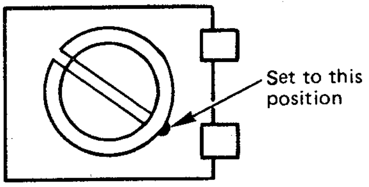


Fig. 4-2-24

Then turn it clockwise slowly and stop at the point where the rising edge of reset pulse is matched with zero-cross point of 28MHz signal.

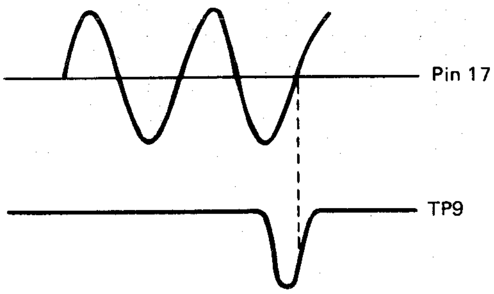


Fig. 4-2-25

(20) Flange-back adjustment

Adjust :	Flange-back adjustment ring
Observe :	Monochrome underscanned video monitor

- Set the filter wheel to 1 (3200°K) position.
- Set SW2 (DETAIL ON/OFF SWITCH) on Detail board to ON position.
- Loosening the flange-back lock knob.
- Set the lens iris to fully open in order to have minimum depth of focus. If the picture on the monochrome underscanned video monitor is saturated. Set the filter wheel to 2 (5600°K + 12.5% ND) position.
- Aim the camera at the resolution chart further than 10 feet (3m) from the camera.
- Zoom in (close up) and adjust lens focus while observing the monochrome underscanned video monitor.
- Zoom out (wide angle) and adjust the focus by turning the flange-back adjustment ring.
- Zoom in again and adjust the lens focus by turning the focus ring.
- Zoom out again and if necessary adjust the focus with the flange-back adjustment ring.
- Repeat this procedure until correct focus is maintained throughout the entire zoom range. When the adjustment has been completed, tighten the flange-back lock knob.

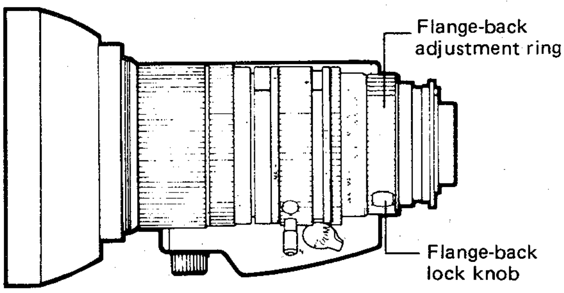


Fig. 4-2-26

■ CCD Drive Board Adjustmlent

(21) Gate timing adjustment

Observe:	Color video monitor	
Test point:	TP5 (GATE PULSE)	Preamplifier board
Adjust:	VR1 (GATE TIME-1)	CCD Drive board
	VR2 (GATE TIME-2)	CCD Drive board

- Set the Color bar/Camera Selection Switch to CAM (CAMERA) position.
- Set the filter wheel to 1 (3200°K) position.
- Set the SW1 (V ON/OFF SWITCH) and SW2 (U ON/OFF SWITCH) on Encoder board to ON position.
- Set SW2 (DETAIL ON/OFF SWITCH) on Detail board to OFF position.
- Set Iris Control Selection Switch on the lens to A (AUTO) position.
- Aim the camera at the resolution chart.
- Adjust lens focus for best resolution on the monochrome underscanned video monitor.
- Adjust VR1 and VR2 for best resolution on the monochrome underscanned video monitor.
- Connect the oscilloscope to TP5 on the Preamplifier board.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Confirm that the gate pulse waveform becomes A equal B. If not, fine-adjust VR1 and VR2.

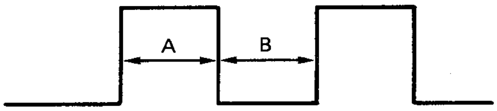


Fig. 4-2-27

- Connect the oscilloscope to TP7 (G OUT) on Preamplifier board and note the green signal waveform (A).

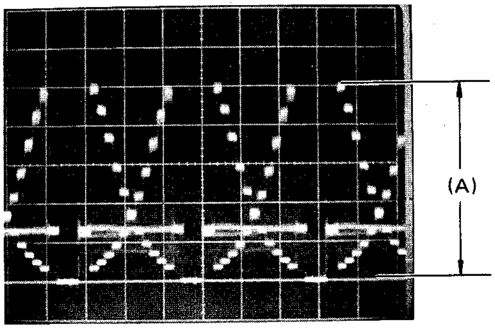


Fig. 4-2-28

- Connect the oscilloscope to TP6 (R OUT) on Preamplifier board and note the red signal waveform (B).

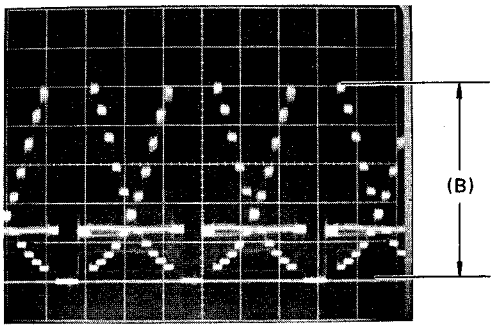


Fig. 4-2-29

- Connect the oscilloscope to TP8 (B OUT) on Preamplifier board and note the blue signal waveform (C).

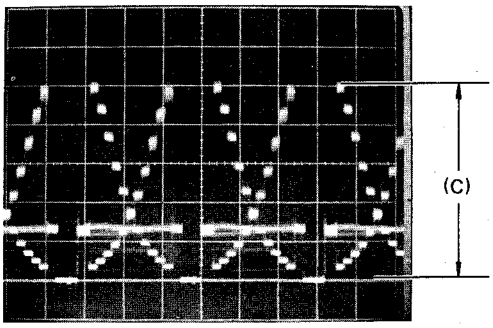


Fig. 4-2-30

- Confirm that signal waveform becomes A>B>C. If not, readjust VR1 and VR2.
- Repeat this procedure until best resolution on the monochrome underscanned video monitor, gate pulse waveform becomes A equal B and green, red and blue signal waveform becomes A>B>C.
- Set SW1 and SW2 on Encoder board, and SW2 on Detail board to ON position.
- Set the Iris Control Selection Switch on the lens to M (Manual) position.

■ Preamplifier Board Adjustment

(22) DC bias voltage adjustment

Test points:	TP6 (R OUT)	Preamplifier board
	TP7 (G OUT)	Preamplifier board
	TP8 (B OUT)	Preamplifier board
Adjusts:	VR1 (R DC BIAS)	Preamplifier board
	VR2 (G DC BIAS)	Preamplifier board
	VR3 (B DC BIAS)	Preamplifier board

- Cap on the lens.
- Connect the oscilloscope to TP6.
- Set the input coupling selector of oscilloscope to DC position.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Expand the horizontal blanking period of R signal.
- Adjust VR1 so that the DC voltage at the optical black portion of R signal at TP6 becomes 0.5V ± 0.05V.

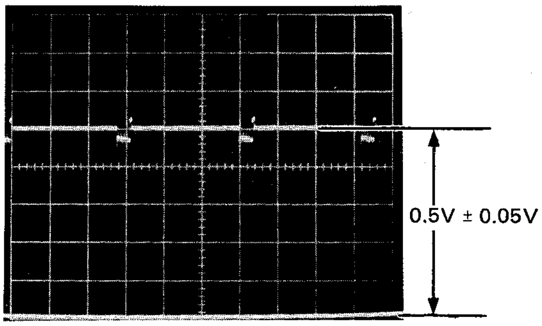


Fig. 4-2-31

- Connect the oscilloscope to TP7.
- Adjust VR2 so that the DC voltage at the optical black portion of G signal at TP7 becomes 0.5V.
- Connect the oscilloscope to TP8.
- Adjust VR3 so that the DC voltage at the optical black portion of B signal at TP8 becomes 0.5V.

(23) White clip adjustment

Test points :	TP7 (G OUT)	Preamplifier board
	TP6 (R OUT)	Preamplifier board
	TP8 (B OUT)	Preamplifier board
Adjusts :	VR5 (G WHITE CLIP)	Preamplifier board
	VR4 (R WHITE CLIP)	Preamplifier board
	VR6 (B WHITE CLIP)	Preamplifier board

- Aim the camera at logarithmic gray scale chart.
- Set the lens iris to F2 position.
- Connect the oscilloscope to TP7.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Adjust VR5 so that the clip level of logarithmic gray scale becomes 2.4Vp-p.

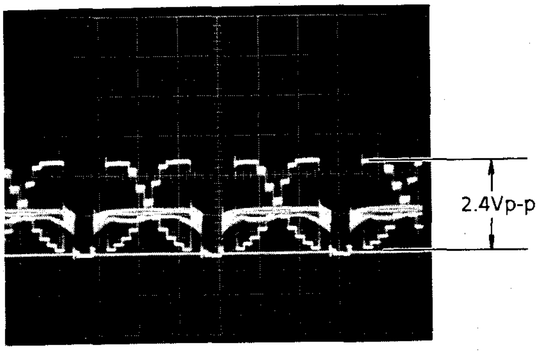


Fig. 4-2-32

- Change the oscilloscope from TP7 to TP6.
- Aim the camera at bright object.
- Set the lens iris to open position.
- Trigger the oscilloscope at V rate using TP6 (VD).
- Adjust VR4 so that the clip level of signal becomes 2.4Vp-p.
- Change the oscilloscope from TP6 to TP8.
- Adjust VR6 so that the clip level of signal becomes 2.4Vp-p.

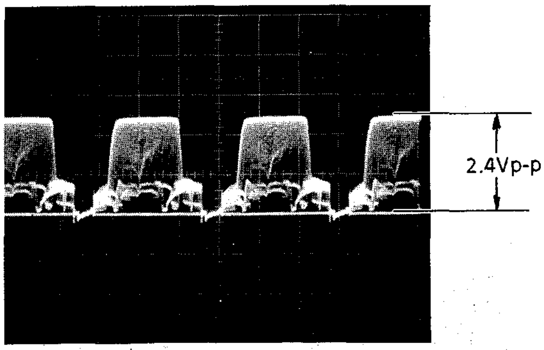


Fig. 4-2-33

■ Process-1 Board Adjustment

For the adjustment of Process-1, Process-2, Detail, Auto and Shading boards, the condition of adjustment should be as follows unless instructed.

Setup

- Distance between the camera and test chart should be 3m.
- Lighting: 2000 lux, incident, 3200°K.

Position of Controls and Switches on the Camera

(Left Side) Viewed from rear

● Filter Wheel	1
● High Gain Selection Switch	0 dB
● Color Bar/Camera Selection Switch	CAM
● White Balance Selection Switch	P SET
● Power Switch	ON

(Inside Setup Panel)

● T PED	Center
● R GAIN	Center
● B GAIN	Center
● Detail Level Selection Switch	OFF
● H PHASE	Center
● SC PHASE	Center
● Lens Iris Control	11 o'clock
● Level Indicator ON/OFF Switch	ON

(Front)

● Auto White/Auto Black Set Switch	HOLD
● Lens Iris Selection Switch	NOR

(Right Side) Viewed from rear

● Power Selector Switch	BATT/EXT DC

(Lens)

● Iris Control Selection Switch	M (Manual)

IMPORTANT NOTICE

Preset the memory in the AUTO board by shorting the 2 preset terminals (TP6, TP7) on the AUTO board for the following adjustment and do not set the Auto White and Black Balance setting switch (AWC, ABC) on the front panel throughout the adjustment.

(24) Flare offset adjustment

Test points :	TP3 (G FLARE)	Process-1 board
	TP7 (R FLARE)	Process-1 board
	TP11 (B FLARE)	Process-1 board
Adjusts :	VR2 (G FLARE OFFSET)	Process-1 board
	VR6 (R FLARE OFFSET)	Process-1 board
	VR10 (B FLARE OFFSET)	Process-1 board

- Set the filter wheel to 4 (CLOSE) position.
- Preset VR3 (G FLARE GAIN), VR7 (R FLARE GAIN) and VR11 (B FLARE GAIN) fully counterclockwise.
- Connect the digital voltmeter to TP3.
- Adjust VR2 so that the DC voltage becomes 0V ± 5mV.
- Connect the digital voltmeter to TP7.
- Adjust VR6 so that the DC voltage becomes 0V ± 5mV.
- Connect the digital voltmeter to TP11.
- Adjust VR10 so that the DC voltage becomes 0V ± 5mV.

(25) Input gain adjustment

Test points :	TP1 (G CDS OUT)	Preamplifier board
	TP2 (G GAIN)	Process-1 board
	TP6 (R GAIN)	Process-1 board
	TP10 (B GAIN)	Process-1 board
Adjusts :	VR1 (G INPUT GAIN)	Process-1 board
	VR5 (R INPUT GAIN)	Process-1 board
	VR9 (B INPUT GAIN)	Process-1 board

- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP1 on Preamplifier board.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Adjust the lens iris so that the G signal level becomes 130mVp-p and **keep this condition until the adjustment is completed**.
- Connect the oscilloscope to TP2.
- Adjust VR1 so that the G signal at TP2 becomes 0.5Vp-p.
- Connect the oscilloscope to TP6.
- Adjust VR5 so that the R signal becomes 0.5Vp-p.
- Connect the oscilloscope to TP10.
- Adjust VR9 so that the B signal becomes 0.5Vp-p.

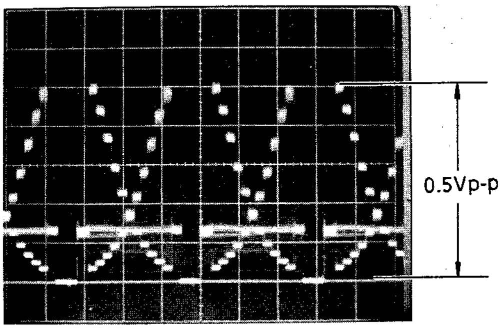


Fig. 4-2-34

(26) Shading correction adjustment (Shading board)

Test points :	TP4 (G OUT)	Process-1 board
	TP8 (R OUT)	Process-1 board
	TP12 (B OUT)	Process-1 board
Adjusts :	VR2 (G H SAWTOOTH)	Shading board
	VR5 (G V SAWTOOTH)	Shading board
	VR19 (G CORNER)	Shading board
	VR3 (R H SAWTOOTH)	Shading board
	VR6 (R V SAWTOOTH)	Shading board
	VR20 (R CORNER)	Shading board
	VR1 (B H SAWTOOTH)	Shading board
	VR4 (B V SAWTOOTH)	Shading board
	VR18 (B CORNER)	Shading board

- Set the filter wheel to 4 (CLOSE) position.
- Set the High Gain Selection Switch to + 18dB position.
- Connect the oscilloscope to TP4.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- When the black signal is clipped or below the blanking level, adjust VR16 (G PEDESTAL) and VR13 (G PULSE CANCEL) on Process-1 board to obtain the black signal.
- Adjust VR2 and VR19 on the Shading board so that the waveform of G signal becomes flat as much as possible.

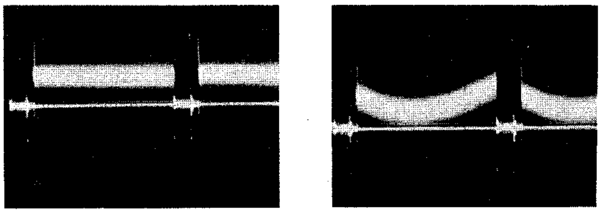

GOOD NO GOOD

Fig. 4-2-35

- Trigger the oscilloscope at V rate using TP6 (VD) on Mother board.
- Adjust VR5 on the Shading board so that the waveform of G signal becomes flat as much as possible.

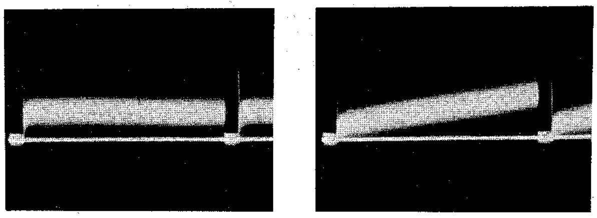

GOOD NO GOOD

Fig. 4-2-36

- Connect the oscilloscope to TP8.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- When the black signal is clipped or below the blanking level, adjust VR17 (R PEDESTAL) and VR14 (R PULSE CANCEL) on Process-1 board to obtain the black signal.
- Adjust VR3 and VR20 on the Shading board so that the waveform of R signal becomes flat as much as possible.
- Trigger the oscilloscope at V rate using TP6 (VD) on Mother board.
- Adjust VR6 on the Shading board so that the waveform of R signal becomes flat as much as possible.
- Connect the oscilloscope to TP12.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- When the black signal is clipped or below the blanking level, adjust VR18 (B PEDESTAL) and VR15 (B PULSE CANCEL) on Process-1 board to obtain the black signal.
- Adjust VR1 and VR18 on Shading board so that the waveform of R signal becomes flat as much as possible.
- Trigger the oscilloscope at V rate using TP6 (VD) on Mother board.
- Adjust VR4 on Shading board so that the waveform of B signal becomes flat as much as possible.
- Set the Gain selection switch to 0dB position.

(27) Frequency adjustment

Test points :	TP2 (G GAIN)	Process-1 board
	TP6 (R GAIN)	Process-1 board
	TP10 (B GAIN)	Process-1 board
Adjusts :	CT1 (G FREQ.)	Process-1 board
	CT2 (R FREQ.)	Process-1 board
	CT3 (B FREQ.)	Process-1 board

- Set the filter wheel to 1 (3200°K) position.
- Aim the camera at the in-mega cycle chart.
- Connect the oscilloscope to TP2.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Adjust CT1 so that the waveform from 0.5MHz to 4MHz becomes flat as much as possible.

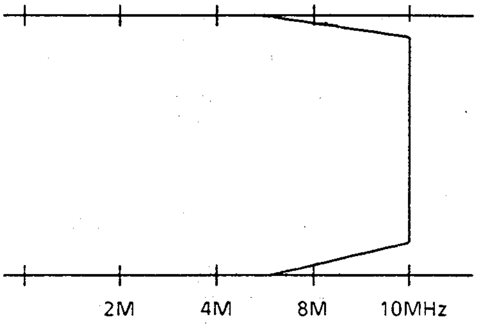


Fig. 4-2-37

- Connect the oscilloscope to TP6.
- Adjust CT2 so that the waveform from 0.5MHz to 4MHz becomes flat as much as possible.
- Connect the oscilloscope to TP10.
- Adjust CT3 so that the waveform from 0.5MHz to 4MHz becomes flat as much as possible.

(28) Pulse cancel and pedestal adjustment

Test points :	TP4 (G OUT)	Process-1 board
	TP8 (R OUT)	Process-1 board
	TP12 (B OUT)	Process-1 board
Adjusts :	VR13 (G PULSE CANCEL)	Process-1 board
	VR16 (G PEDESTAL)	Process-1 board
	VR14 (R PULSE CANCEL)	Process-1 board
	VR17 (R PEDESTAL)	Process-1 board
	VR15 (B PULSE CANCEL)	Process-1 board
	VR18 (B PEDESTAL)	Process-1 board

- Set the filter wheel to 4 (CLOSE) position.
- Confirm that the Auto board is preset.
- Confirm that the T PED control inside the setup panel is set to its mechanical center.

■ G pulse cancel and pedestal adjustment

- Connect the oscilloscope to TP4.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Preset VR16 so that the pedestal level of G signal becomes 60mV.
- Adjust VR13 so that the pedestal level of G signal is not varied (stayed in the same level) while changing the High Gain Selection Switch between 0dB and +18dB position.
- Set the High Gain Selection Switch to 0dB position.
- Adjust VR16 so that the pedestal level of G signal becomes 15mV.

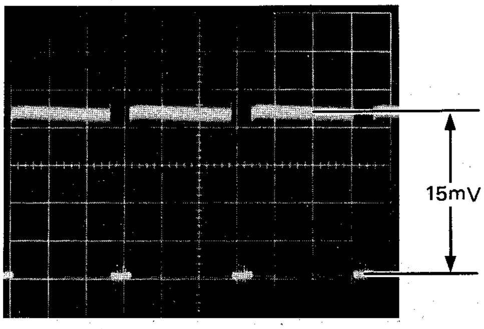


Fig. 4-2-38

R pulse cancel and pedestal adjustment

- Connect the oscilloscope to TP8.
- Preset VR17 so that the pedestal level of R signal becomes 60mV.
- Adjust VR14 so that the pedestal level of R signal is not varied (stayed in the same level) while changing the High Gain Selection Switch between 0dB and +18dB position.
- Set the High Gain Selection Switch to 0dB position.
- Adjust VR17 so that the pedestal level of R signal becomes 15mV.

B pulse cancel and pedestal adjustment

- Connect the oscilloscope to TP12.
- Preset VR18 so that the pedestal level of B signal becomes 60mV.
- Adjust VR15 so that the pedestal level of B signal is not varied (stayed in the same level) while changing the High Gain Selection Switch between 0dB and +18dB position.
- Set the High Gain Selection Switch to 0dB position.
- Adjust VR18 so that the pedestal level of B signal becomes 15mV.

(29) Output gain adjustment

Test points :	TP4 (G OUT)	Process-1 board
	TP8 (R OUT)	Process-1 board
	TP12 (B OUT)	Process-1 board
Adjusts :	VR4 (G OUTPUT GAIN)	Process-1 board
	VR8 (R OUTPUT GAIN)	Process-1 board
	VR12 (B OUTPUT GAIN)	Process-1 board

- Set the filter wheel to 1 (3200°K) position.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP1 on Preamplifier board.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Adjust the lens iris so that the G signal level becomes 130mVp-p.
- Connect the oscilloscope to TP2 (G GAIN).
- Confirm that the G signal at TP2 is 0.5Vp-p. If not,adjust VR1 (G INPUT GAIN) .
- Connect the oscilloscope to TP4.
- Adjust VR4 so that the G signal becomes 0.7Vp-p.

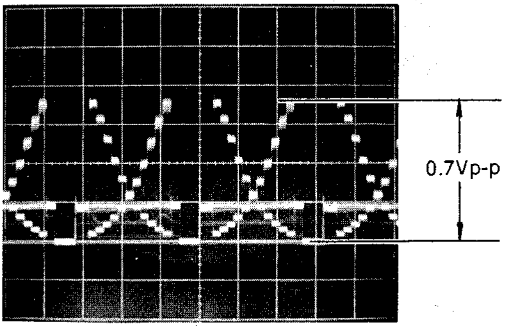


Fig. 4-2-39

- Connect the oscilloscope to TP6 (R GAIN).
- Confirm that the R signal at TP6 is 0.5Vp-p. If not,adjust VR5 (R INPUT GAIN).
- Connect the oscilloscope to TP8.
- Adjust VR8 so that the R signal becomes 0.7Vp-p.
- Connect the oscilloscope to TP10 (B GAIN).
- Confirm that the B signal at TP10 is 0.5Vp-p. If not,adjust VR9 (B INPUT GAIN).
- Connect the oscilloscope to TP12.
- Adjust VR12 so that the B signal becomes 0.7Vp-p.

Process-2 Board Adjustment

Set the SW1 (BYPASS SWITCH) on the Detail board to PASS position and SW2 (DETAIL ON/OFF SWITCH) on the Detail board to OFF position.
Set the SW1 (MATRIX ON/OFF SWITCH) on the Process-2 board to OFF position.

(30) Output gain adjustment

Test points :	TP1 (G OUT)	Process-2 board
	TP2 (R OUT)	Process-2 board
	TP3 (B OUT)	Process-2 board
Adjusts :	VR1 (G GAMMA GAIN)	Process-2 board
	VR3 (G GAIN)	Process-2 board
	VR4 (R GAMMA GAIN)	Process-2 board
	VR6 (R GAIN)	Process-2 board
	VR7 (B GAMMA GAIN)	Process-2 board
	VR9 (B GAIN)	Process-2 board

- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP5 (G IN).
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Adjust the lens iris so that the G signal level becomes 0.7Vp-p.
- Connect the oscilloscope to TP6 (R IN).
- Confirm that the R signal at TP6 is 0.7Vp-p. If not,fine-adjust VR5 (R INPUT GAIN) on the Process-1 board.
- Connect the oscilloscope to TP7 (B IN).
- Confirm that the B signal at TP7 is 0.7Vp-p. If not,fine-adjust VR9 (B INPUT GAIN) on the Process-1 board.
- Connect the oscilloscope to TP1.
- Adjust VR3 so that the G signal becomes 0.7Vp-p. When the signal is clipped by white clip, release VR18 (G WHITE CLIP).
- Confirm that the G signal at TP1 is 0.7Vp-p while turning VR2 (G GAMMA) fully clockwise and fully counterclockwise. If not, adjust VR1 (G GAMMA GAIN) so that the G signal becomes 0.7Vp-p while setting VR2 fully clockwise and adjust VR3 so that the G signal becomes 0.7Vp-p while setting VR2 fully counterclockwise.

- Repeat above step until G signal at TP1 is maintained 0.7Vp-p while turning VR2 (G GAMMA).

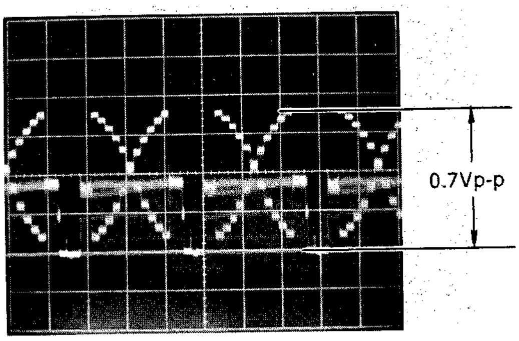


Fig. 4-2-40

- Set VR2 to its mechanical center temporarily.
- Connect the oscilloscope to TP2.
- Adjust VR6 so that the R signal becomes 0.7Vp-p. When the signal is clipped by white clip, release VR17 (R WHITE CLIP).
- Confirm that the R signal at TP2 is 0.7Vp-p while turning VR5 (R GAMMA) fully clockwise and fully counterclockwise. If not, adjust VR4 (R GAMMA GAIN) so that the R signal becomes 0.7Vp-p while setting VR5 fully clockwise and adjust VR6 so that the R signal becomes 0.7Vp-p while setting VR5 fully counterclockwise.
- Repeat above step until R signal at TP2 is maintained 0.7Vp-p while turning VR5 (R GAMMA).
- Set VR5 to its mechanical center temporarily.
- Connect the oscilloscope to TP3.
- Adjust VR9 so that the B signal becomes 0.7Vp-p. When the signal is clipped by white clip, release VR16 (B WHITE CLIP).
- Confirm that the B signal at TP3 is 0.7Vp-p while turning VR8 (B GAMMA) fully clockwise and fully counterclockwise. If not, adjust VR7 (B GAMMA GAIN) so that the B signal becomes 0.7Vp-p while setting VR8 fully clockwise and adjust VR9 so that the B signal becomes 0.7Vp-p while setting VR8 fully counterclockwise.
- Repeat above step until B signal at TP3 is maintained 0.7Vp-p while turning VR8 (B GAMMA).
- Set VR8 to its mechanical center temporarily.

(31) Pedestal fine-adjustment (Process-1 board)

Adjusts :	T.PED	SETUP PANEL
	VR16 (G PEDESTAL)	Process-1 board
	VR17 (R PEDESTAL)	Process-1 board
	VR18 (B PEDESTAL)	Process-1 board
Observes:	Waveform monitor	
	Vector scope	

- Set the filter wheel to 4 (CLOSE).
- Set the High Gain Selection Switch to 0 dB position.
- Confirm that the T.PED control inside setup panel is set to its mechanical center.
- While observing the waveform monitor, adjust VR16 on the Process-1 board so that the camera pedestal level of the composite video signal becomes 35mV ± 10.5mV .
- Adjust VR17 and VR18 on process-1 board so that the carrier is minimum on the waveform monitor or vector positions on the center on the vectorscope.

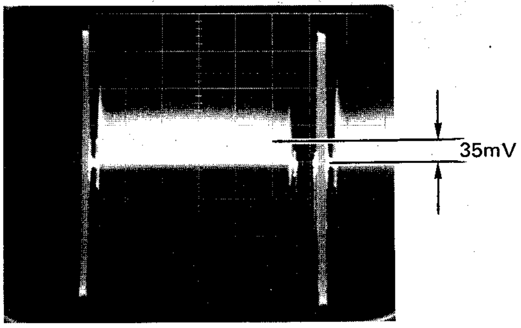


Fig. 4-2-41

(32) Gamma (High Gain) adjustment

Adjusts :	VR2 (G HI-GAIN GAMMA)	Process-2 board
	VR5 (R HI-GAIN GAMMA)	Process-2 board
	VR8 (B HI-GAIN GAMMA)	Process-2 board
Observes :	Waveform monitor	
	Vector scope	

- Set the High Gain Selection Switch to + 18 dB position.
- Aim the camera at the logarithmic gray scale chart.
- Set the lens iris so that the composite video signal becomes 0.7V.
- While observing the waveform monitor, adjust VR2 so that the crosspoint level of the gray scale of the composite video signal becomes 315mV - 329mV.

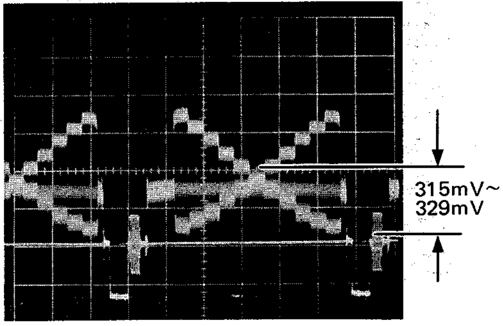


Fig. 4-2-42

- Adjust VR5 and VR8 so that the carrier on the crosspoint of gray scale waveform is minimum.

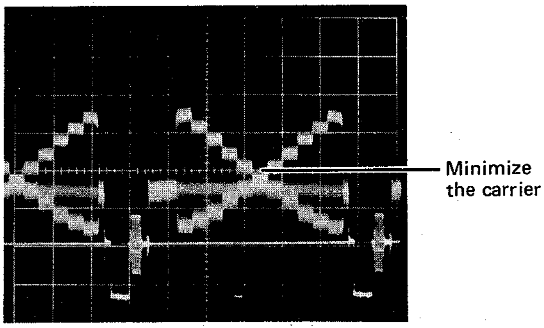


Fig. 4-2-43

- Set the High Gain Selection Switch to 0dB position.

(33) Gamma adjustment

Adjusts :	VR21 (G GAMMA)	Process-2 board
	VR22 (R GAMMA)	Process-2 board
	VR23 (B GAMMA)	Process-2 board
Observes :	Waveform monitor	
	Vector scope	

- Set the filter wheel to 1 (3200°K).
- Set the High Gain Selection Switch to 0 dB position.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP5 (G IN) on Process-2 board.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Confirm that the G signal level is 0.7Vp-p. If not, readjust lens iris. When the signal is clipped by white clip, release VR18 (G WHITE CLIP).
- Confirm that the composite video signal level is 0.7V. If not, readjust lens iris. When the signal is clipped by white clip, release VR18 (G WHITE CLIP), VR17 (R WHITE CLIP) and VR16 (B WHITE CLIP).
- While observing the waveform monitor, adjust VR21 on the Process-2 board so that the crosspoint level of the gray scale of the composite video signal becomes 399mV.

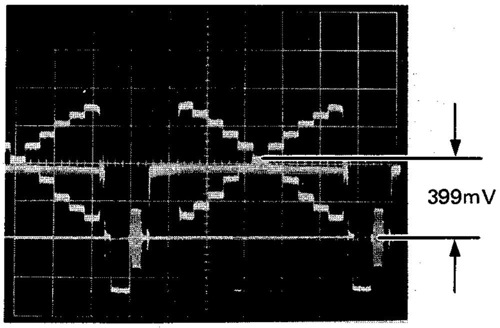


Fig. 4-2-44

- Adjust VR22 and VR23 so that the carrier on the crosspoint of gray scale waveform is minimum.

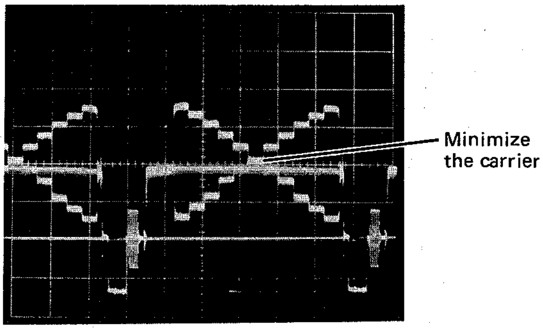


Fig. 4-2-45

■ Detail Board Adjustment

Set the SW1 (BYPASS SWITCH) on the Detail board to ON position and SW2 (DETAIL ON / OFF SWITCH) on the Detail board to ON position.
Set the Detail Level Selection Switch inside SETUP panel to HIGH position.

(34) PLL (Phase Lock Loop) adjustment

Test point:	TP13(PD)	Detail board
Adjust:	CT1 (PLL LOCK)	Detail board

- Connect the oscilloscope to TP13.
- Adjust CT1 so that the DC voltage becomes 3V ± 0.1V.

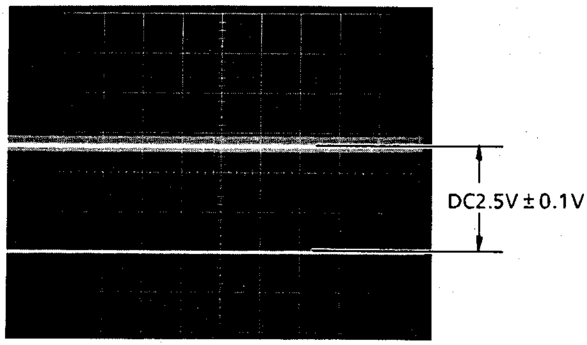


Fig. 4-2-46

(35) 1H sync level adjustment

Test point:	TP2(CCD-1 IN)	Detail board
Adjust:	VR4 (SYNC LEVEL)	Detail board

- Set the filter wheel to 1 (3200°K) position.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP1 (0H).
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Adjust lens iris so that the G signal level becomes 0.85Vp-p. When the signal is clipped by white clip, release VR18 (G WHITE CLIP) on the Process-2 board. **keep this iris condition throughout the Detail board adjustment.**
- Connect the oscilloscope to TP2.
- Adjust VR4 so that the sync level becomes 0.1Vp-p.

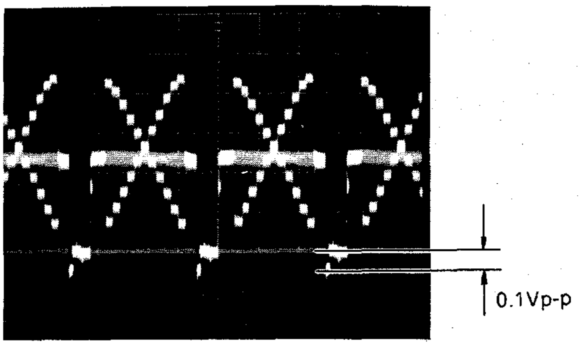
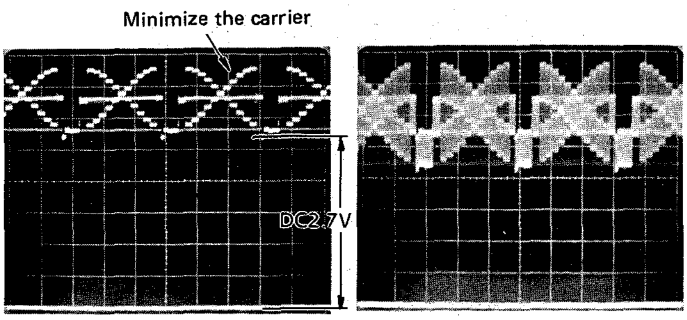


Fig. 4-2-47

(36) 1H CCD V_{GG} adjustment

Test point :	TP3(CCD-1 OUT)	Detail board
Adjusts :	VR5 (1H V_{GG-1})	Detail board
	VR6 (1H V_{GG-2})	Detail board

- Connect the oscilloscope to TP3.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Adjust VR5 and VR6 so that the DC level of sync chip becomes 2.7V and the carrier on the gray scale waveform becomes minimum.



GOOD NO GOOD

Fig. 4-2-48

(37) 1H CCD dynamic range adjustment

Test points :	TP1(0H)	Detail board
	TP3(CCD-1 OUT)	Detail board
Adjust :	VR3 (1H CCD D RANGE)	Detail board

- Connect the oscilloscope to TP1 (A channel) and TP3 (B channel).
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Set the B channel of oscilloscope to INV (Invert) and ADD mode.
- Set the GAIN of A channel of oscilloscope to CAL and adjust the GAIN of B channel so that the level of gray scale on the oscilloscope becomes minimum.

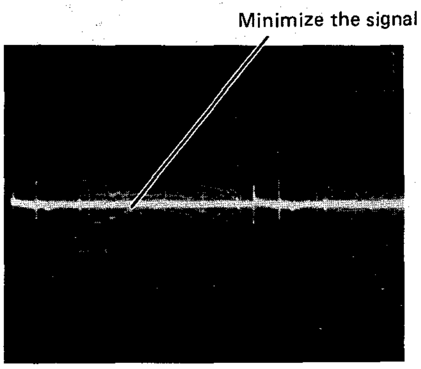


Fig. 4-2-49

- While observing the oscilloscope, adjust (rotate) VR3 clockwise as much as possible within the range that waveform level of gray scale is maintained minimum.

(38) 1H output gain adjustment

Test points :	TP4(1H CCD)	Detail board
	TP5(1H)	Detail board
Adjusts :	VR7 (1H OUTPUT GAIN-1)	Detail board
	VR8 (1H OUTPUT GAIN-2)	Detail board
	VR9 (1H BLACK CLIP)	Detail board

- Connect the oscilloscope to TP5.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Adjust VR7 so that the signal level (excluding sync) at TP5 becomes 0.85Vp-p.

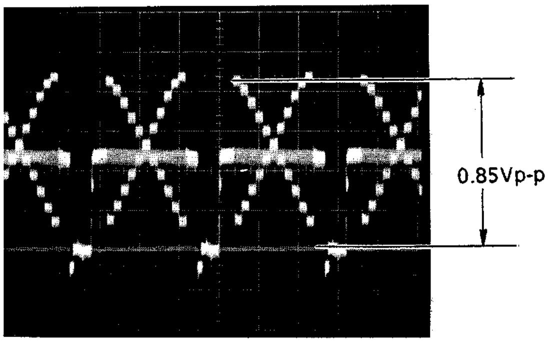


Fig. 4-2-50

- While shortening TP14 (AWC BUSY) and TP15 (GND) of Detail board, adjust VR8 so that the signal level (excluding sync) at TP5 becomes 0.85Vp-p.
- While observing TP4 and TP5 of Detail board, adjust VR9 so that the sync signal only is clipped at TP5. and confirm that the signal level (excluding sync) at TP5 is 0.85Vp-p.

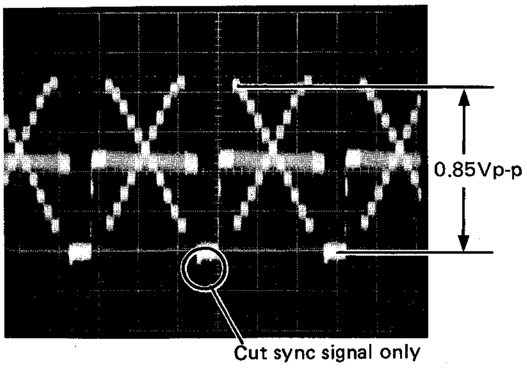


Fig. 4-2-51

(39) 2H CCD VGG adjustment

Test point :	TP7(CCD-2)	Detail board
Adjusts :	VR11 (2H VGG-1)	Detail board
	VR12 (2H VGG-2)	Detail board

- Connect the oscilloscope to TP7.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Adjust VR11 and VR12 so that the DC level of sync chip becomes 2.7V and the carrier on the gray scale waveform becomes minimum.

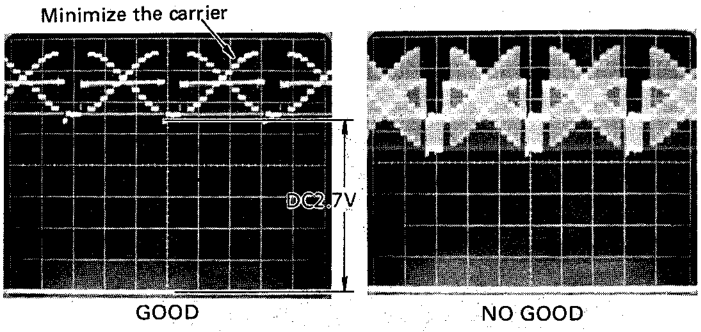


Fig. 4-2-52

(40) 2H CCD dynamic range adjustment

Test points :	TP1(0H)	Detail board
	TP7(CCD-2 OUT)	Detail board
Adjust:	VR10 (2H CCD D RANGE)	Detail board

- Connect the oscilloscope to TP1 (A channel) and TP7 (B channel).
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Set the B channel of oscilloscope to INV (Invert) and ADD mode.
- Set the GAIN of A channel of oscilloscope to CAL and adjust the GAIN of B channel so that the level of gray scale on the oscilloscope becomes minimum.

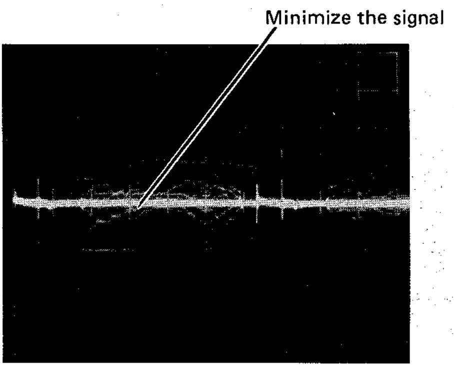


Fig. 4-2-53

- While observing the oscilloscope, adjust (rotate) VR10 clockwise as much as possible within the range that waveform level of gray scale is maintained minimum.

(41) 2H output gain adjustment

Test points:	TP8(2H CCD)	Detail board
	TP9(2H)	Detail board
Adjusts:	VR13 (2H OUTPUT GAIN-1)	Detail board
	VR14 (2H OUTPUT GAIN-2)	Detail board
	VR15 (2H BLACK CLIP)	Detail board

- Connect the oscilloscope to TP9.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Adjust VR13 so that the signal level (excluding sync) at TP9 becomes 0.85Vp-p.

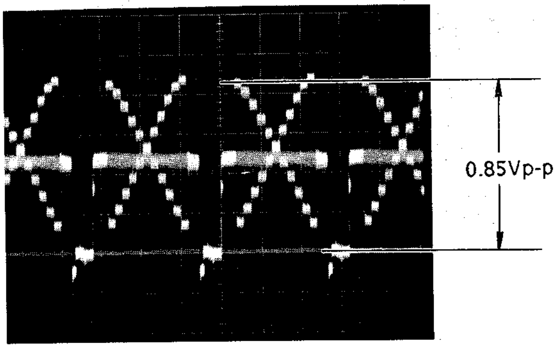
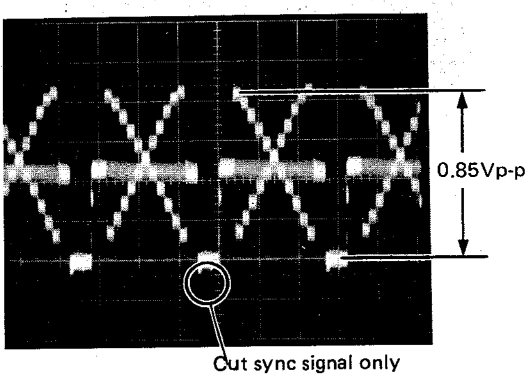


Fig. 4-2-54

- While shortening TP14 (AWC BUSY) and TP15 (GND) of Detail board, adjust VR14 so that the signal level (excluding sync) at TP9 becomes 0.85Vp-p .
- While observing TP8 and TP9 of Detail board, adjust VR15 so that the sync signal only is clipped at TP9. and confirm that the signal level (excluding sync) at TP9 is 0.85Vp-p.



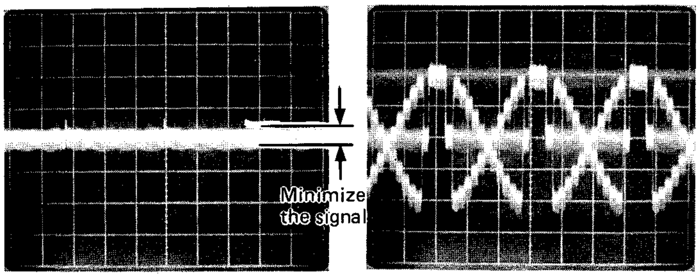
Cut sync signal only

Fig. 4-2-55

(42) V.aperture balance adjustment

Test point:	TP10(V AP)	Detail board
Adjust:	VR18 (V APERTURE BAL)	Detail board

- Connect the oscilloscope to TP10.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Turn VR19 (V APERTURE GAIN) fully clockwise.
- Adjust VR18 to cancel (minimize) the video signal.



GOOD NO GOOD

Fig. 4-2-56

(43) H.aperture symmetry adjustment

Test point:	TP11(H AP)	Detail board
Adjusts:	VR21 (H APERTURE SYMMETRY-2)	Detail board
	VR20 (H APERTURE SYMMETRY-1)	Detail board

- Aim the camera at the window (white set) chart and adjust the lens iris so that the white level of the window chart on the composite video signal on waveform monitor becomes 80 IRE.
- Turn VR22 (H APERTURE GAIN) fully clockwise.
- Connect the oscilloscope to TP11.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Adjust VR20 to its mechanical center.
- Adjust VR21 so that the left and right horizontal aperture signal levels becomes equal.

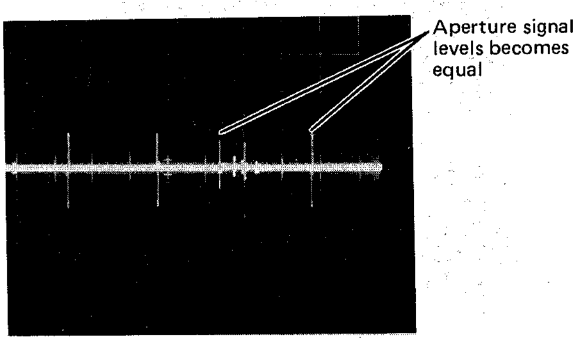


Fig. 4-2-57

(44) Noise suppress adjustment

Test point :	TP12 (T AP)	Detail board
Adjusts :	VR27 (NOISE SUPPRESS)	Detail board
	VR26 (GAIN-1 NOISE SUPPRESS)	Detail board
	VR25 (GAIN-2 NOISE SUPPRESS)	Detail board

- Set the filter wheel to 4 (CLOSE) position.
- Set the High Gain Selection Switch to 0dB position.
- Rotate VR28 (TOTAL APERTURE) fully clockwise to have maximum aperture signal.
- Rotate VR23 (LEVEL DEPENDENT) fully counterclockwise to release the level dependent of aperture signal.
- Connect the oscilloscope to TP12.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Rotate VR27 fully counterclockwise to release the total noise suppress of aperture signal and note noise level as (A).
- Set the High Gain Selection Switch to +9dB position.
- Adjust VR26 so that the noise level at TP12 becomes (1/2 X A).

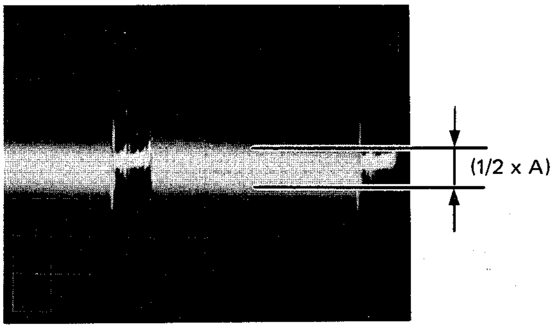


Fig. 4-2-58

- Set the High Gain Selection Switch to +18dB position.
- Adjust VR25 so that the noise level at TP12 becomes (1/3 X A).
- Set the High Gain Selection Switch to 0dB position.

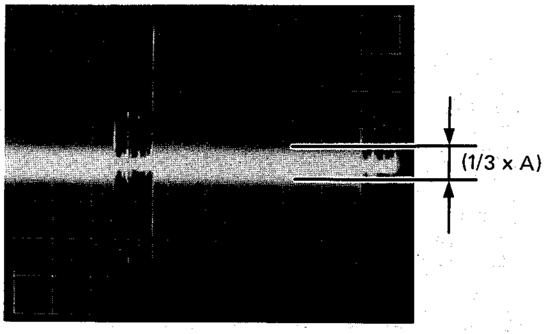
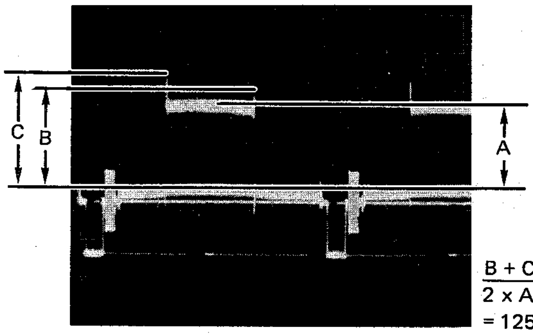


Fig. 4-2-59

(45) Total aperture level adjustment

Adjusts :	VR19 (V APERTURE GAIN)	Detail board
	VR22 (H APERTURE GAIN)	Detail board
Observe :	Waveform monitor	

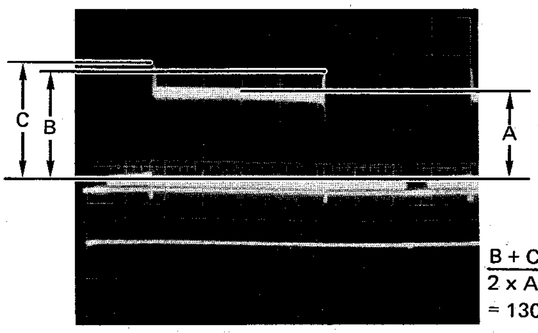
- Set the filter wheel to 1 (3200°K) position.
- Set the High Gain Selection Switch to 0dB position.
- Aim the camera at the window chart and adjust lens iris so that the white level becomes 0.5V.
- Set the Detail Level Selection Switch inside SETUP panel to HIGH position.
- Adjust VR22 so that the average of left and right horizontal aperture signal levels becomes 125% ± 5% of the white level. If the aperture level is insufficient, adjust VR28.



$$\frac{B+C}{2 \times A} \times 100\% = 125\% \pm 5\%$$

Fig. 4-2-60

- Set the waveform monitor to vertical rate.
- Adjust VR19 so that the average of left and right vertical aperture signal levels becomes 130% ± 5% of the white level.



$$\frac{B+C}{2 \times A} \times 100\% = 130\% \pm 5\%$$

Fig. 4-2-61

(46) V.aperture balance fine-adjustment

Adjust :	VR18 (V APERTURE BAL)	Detail board
Observe :	Waveform monitor	

- Aim the camera at the logarithmic gray scale chart and adjust lens iris so that the white level becomes 0.7V.
- Fine-adjust VR18 so that the gray scale signal level is not varied while changing the SW2 (DETAIL ON/OFF SWITCH).

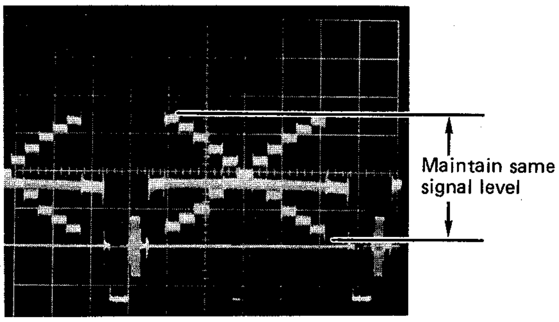


Fig. 4-2-62

- After adjusting VR18, set the SW2 (DETAIL ON/OFF SWITCH) to ON position.

(47) Level dependent adjustment

Adjusts :	VR23 (LEVEL DEPENDENT)	Detail board
	VR24 (GAIN-2 LEVEL DEPENDENT)	Detail board
Observe ;:	Waveform monitor	

- Set the filter wheel to 1 (3200°K) position.
- Set the High Gain Selection Switch to 0dB position.
- Aim the camera at the logarithmic gray scale chart and adjust lens iris so that the white level becomes 0.7V.
- Adjust VR23 so that the aperture signal on the lowest step of gray scale signal only is suppressed.

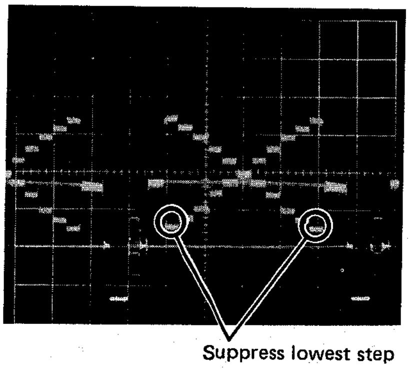


Fig. 4-2-63

- Rotate VR24 fully counterclockwise.

(48) White balance fine adjustment (process-1 and Process-2 board)

Test point :	VIDEO OUT	
Adjusts :	VR17 (R PEDESTAL)	Process-1 board
	VR18 (B PEDESTAL)	Process-1 board
	VR22 (R GAMMA)	Process-2 board
	VR6 (R GAIN)	Process-2 board
	VR23 (B GAMMA)	Process-2 board
	VR9 (B GAIN)	Process-2 board
Observe :	Waveform monitor	

- Fine-adjust VR22, VR6, VR17, VR23, VR9 and VR18 so that the carrier on the video signal becomes minimum.

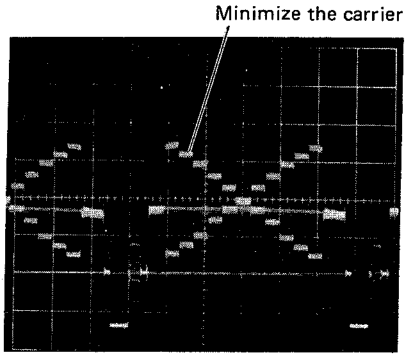


Fig. 4-2-64

(49) Total pedestal fine adjustment

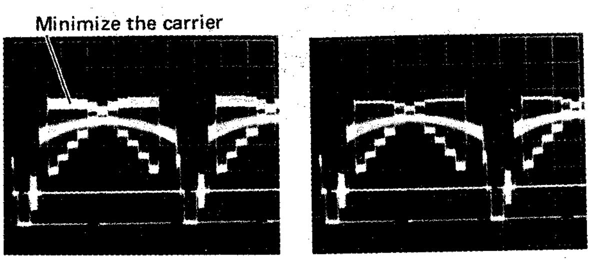
Adjust :	VR12 (TOTAL PEDESTAL)	Shading Board
Observe :	Waveform monitor	

- Set the filter wheel to 4 (CLOSE).
- Fine adjust VR12 so that the pedestal level becomes 35mV ± 10.5mV.

(50) White clip adjustment (Process-2 board)

Adjusts :	VR18(G WHITE CLIP)	Process-2 board
	VR17 (R WHITE CLIP)	Process-2 board
	VR16 (B WHITE CLIP)	Process-2 board
Observe :	Waveform monitor	

- Set the filter wheel to 1 (3200°K) position.
- Set the High Gain Selection Switch to 0dB position.
- Aim the camera at the logarithmic gray scale chart and adjust lens iris so that the white level becomes 0.7V.
- Set the High Gain Selection Switch to +9dB position.
- Adjust VR18 so that the clip level of gray scale signal becomes 0.785V. (For better viewing, set the display mode of waveform monitor to LUMINANCE or LOW PASS FILTER position to delete the chroma component.)
- Adjust VR17 and VR16 so that the carrier on the clip level of gray scale signal becomes minimum.
- Repeat adjusting VR18, VR17 and VR16 so that the clip level of gray scale signal becomes 0.785V and the carrier on the clip level of gray scale signal becomes minimum.



GOOD NO GOOD

Fig. 4-2-65

- Set the High Gain Selection switch to 0dB position.

(51) R.B.phase adjustment (Process-2 board)

Adjusts :	VR19 (R PHASE)	Process-2 board
	VR20 (B PHASE)	Process-2 board
Observe :	Monochrome underscanned video monitor	

- Set the filter wheel to 1 (3200°K) position.
- Set the High Gain Selection Switch to 0dB position.
- Aim the camera at the resolution chart and adjust lens iris so that the white level becomes 0.7V.
- Set the SW1 (BYPASS SWITCH) on Detail board to ON position. and SW2 (DETAIL ON/OFF SWITCH) on Detail board to OFF position.
- Set the SW1 (V ON/OFF SWITCH) and SW2 (U ON/OFF SWITCH) on Encoder board to ON position.
- Adjust VR19 and VR20 so that the resolution of vertical lines around 500 to 600 lines becomes the best resolution on the monochrome underscanned video monitor.

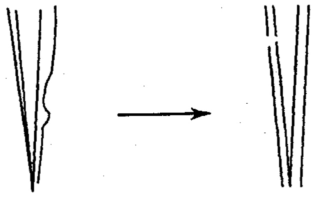


Fig. 4-2-66

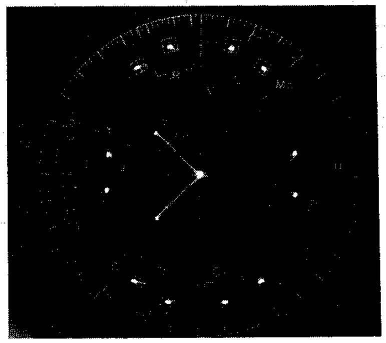
- Set SW2 (DETAIL ON/OFF SWITCH) on Detail board to ON position.

(52) Matrix adjustment (Process-2 board)

Adjusts :	VR10 (B + (B-G))	Process-2 board
	VR11 (G + (G-B))	Process-2 board
	VR12 (G + (G-R))	Process-2 board
	VR13 (R + (R-G))	Process-2 board
	VR14 (R + (R-B))	Process-2 board
	VR15 (B + (B-R))	Process-2 board
Observe :	Vectorscope	

- Set the SW1 (MATRIX ON/OFF SWITCH) on the Process-2 board to ON position.
- Aim the camera at the color chip chart.
- Confirm that the white balance is adjusted properly.
- Adjust VR10, VR11, VR12, VR13, VR14 and VR15 so that the red, yellow, green, cyan blue and magenta vectors on the vectorscope becomes as follows.

Color	Amplitude (Burst = 100%)	Phase
Red	233% ± 40%	103 ± 2°
Yellow	194% ± 40%	152 ± 2°
Green	162% ± 45%	240 ± 7°
Cyan	236% ± 45%	288 ± 7°
Blue	149% ± 25%	339 ± 7°
Magenta	186% ± 30%	77 ± 7°



- Set the SW1 to OFF position.

Fig. 4-2-67

(53) Flare adjustment (Process-1 board)

Adjusts :	VR3 (G FLARE GAIN)	Process-1 board
	VR7 (R FLARE GAIN)	Process-1 board
	VR11 (B FLARE GAIN)	Process-1 board
Observe:	Waveform monitor	

- Set the filter wheel to 1 (3200°K) position.
- Set the High Gain Selection Switch to 0dB position.
- Aim the camera at the gray scale chart and adjust lens iris so that the white level becomes 0.7V and note the F. STOP of lens iris as (A).
- Open 2 F.STOP of lens iris from (A).
- Confirm that the VR3 is set to fully counterclockwise.
- Adjust VR7 and VR11 so that the carrier leak on the lowest step of gray scale becomes minimum. If not, fine-adjust the VR3 to clockwise just a little and adjust VR7 and VR11 so that the carrier leak on the lowest step of gray scale becomes minimum.

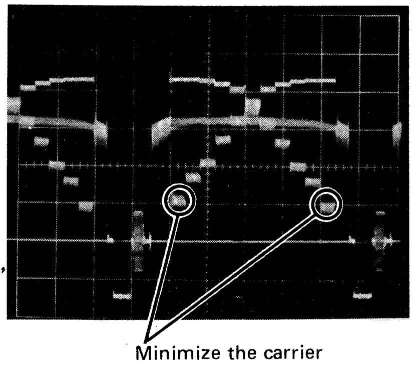


Fig. 4-2-68

- Set the filter wheel to 4 (CLOSE) position.
- Confirm that the black balance is maintained. If not, fine-adjust the flare offset adjustment on the process-1 board.
- Repeat above steps so that the black balance is maintained from lens close to 2 F.STOP open of lens iris.

(54) Level indicator adjustment

Adjust :	VR13 (ZEBRA ADJ) Encoder board
Observe :	Viewfinder

- Set the filter wheel to 1 (3200°K) position.
- Set the High Gain Selection Switch to 0dB position.
- Aim the camera at the logarithmic gray scale chart.
- Set Level Indicator ON/OFF Switch inside setup panel is set to ON position.
- Set the lens iris so that white level becomes 0.686V.
- Adjust VR13 so that the white chip (top step) of the logarithmic gray scale does not turn into ZEBRA pattern on the viewfinder.
- Set the lens iris so that the white level becomes 0.721V.
- Adjust VR13 so that the white chip (top step) of the logarithmic gray scale turns into ZEBRA pattern on the viewfinder.
- Repeat this procedure until the white chip (top step) of the logarithmic gray scale turns into ZEBRA pattern at 0.721V and does not turn into ZEBRA pattern at 0.686V.

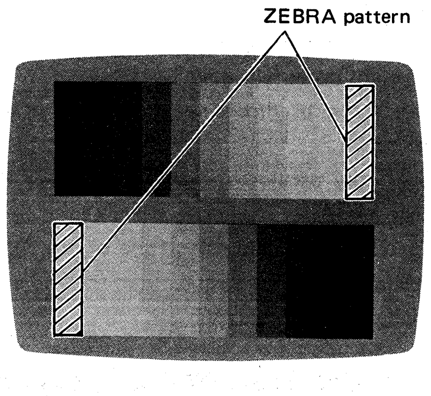
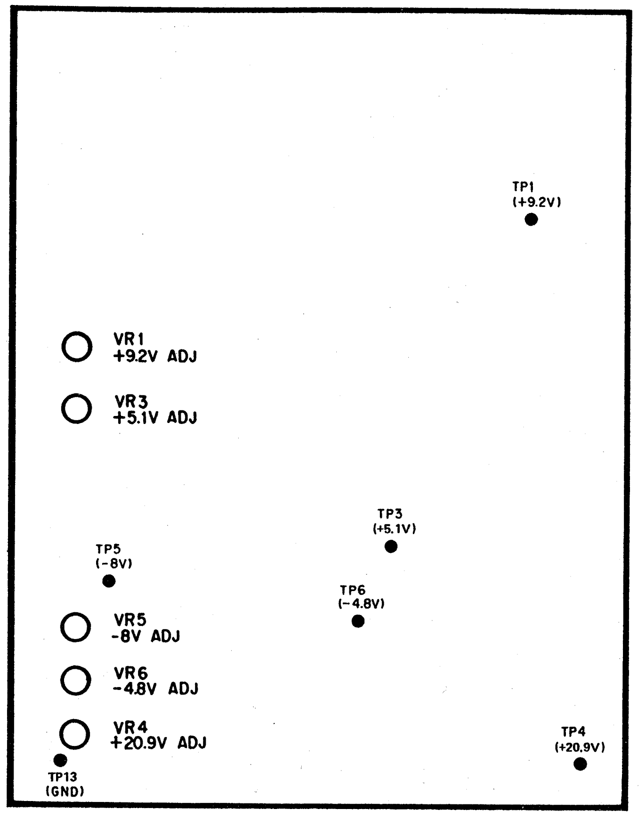

ZEBRA pattern

Fig. 4-2-69

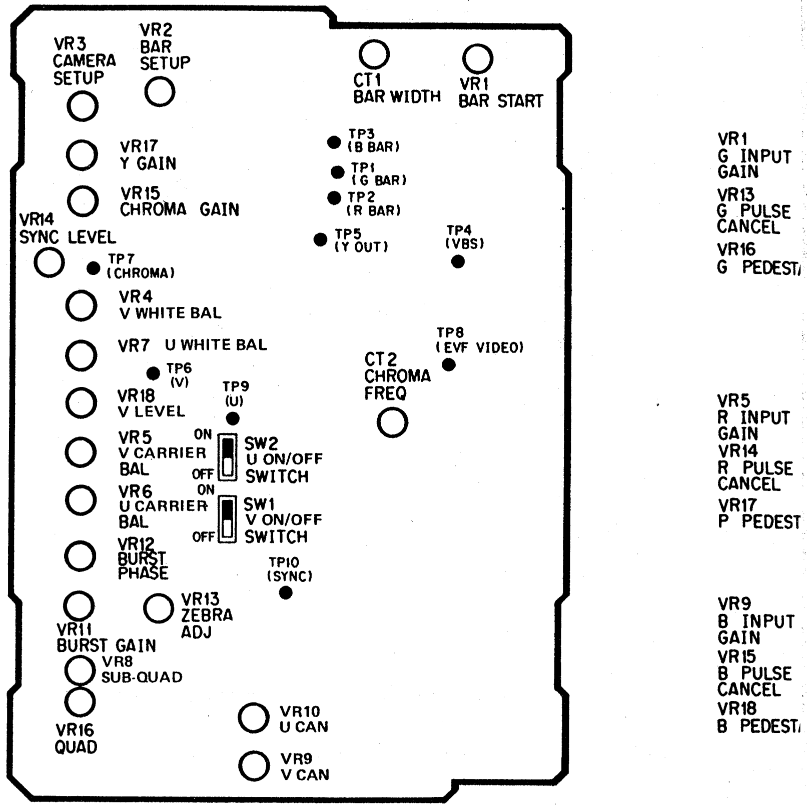
LOCATION OF TEST POINTS AND ADJUSTING CONTROLS – Component Side –

< Camera Head >

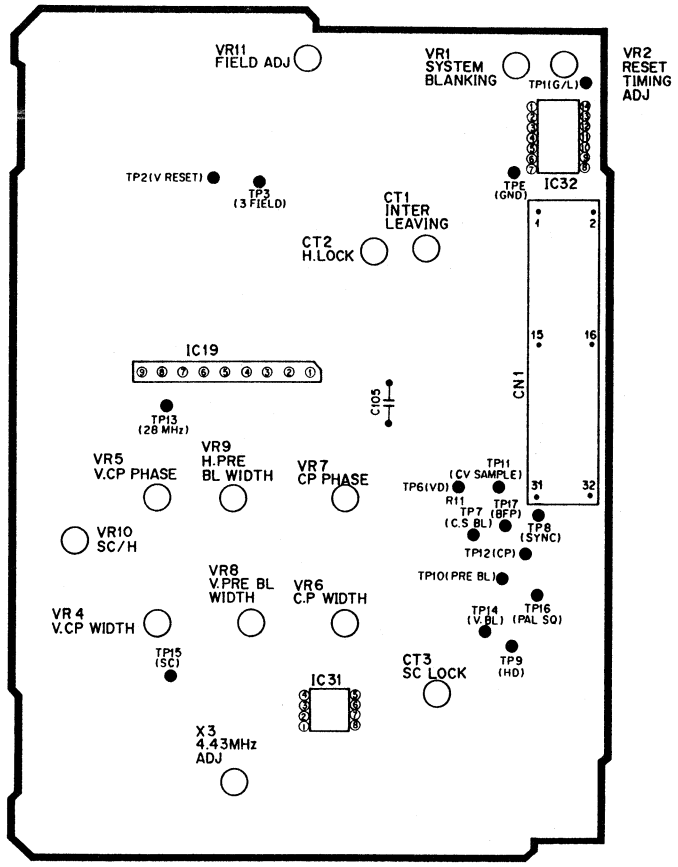
POWER BOARD


TP1
(+9.2V)
VR1
+9.2V ADJ
VR3
+5.1V ADJ
TP3
(+5.1V)
TP5
(−8V)
TP6
(−4.8V)
VR5
−8V ADJ
VR6
−4.8V ADJ
VR4
+20.9V ADJ
TP4
(+20.9V)
TP13
(GND)

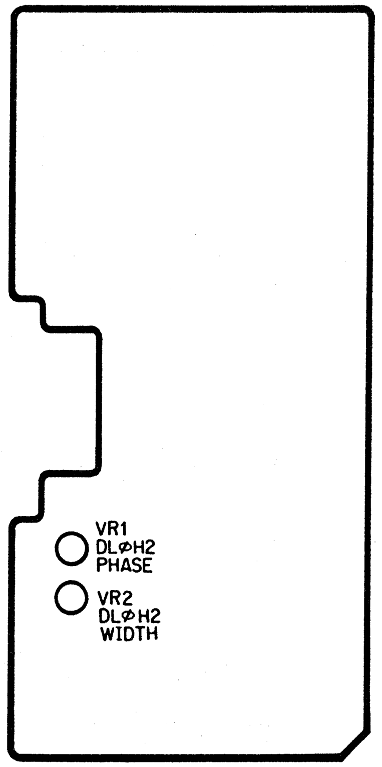
ENCODER BOARD


VR3
CAMERA
SETUP
VR2
BAR
SETUP
CT1
BAR WIDTH
VR1
BAR START
VR17
Y GAIN
TP3
(B BAR)
TP1
(G BAR)
TP2
(R BAR)
VR15
CHROMA GAIN
VR14
SYNC LEVEL
TP5
(Y OUT)
TP4
(VBS)
TP7
(CHROMA)
VR4
V WHITE BAL
VR7 U WHITE BAL
TP8
(EVF VIDEO)
CT2
CHROMA
FREQ
TP6
(V)
TP9
(U)
VR18
V LEVEL
VR5
V CARRIER
BAL
ON
OFF
SW2
U ON/OFF
SWITCH
VR6
U CARRIER
BAL
ON
OFF
SW1
V ON/OFF
SWITCH
VR12
BURST
PHASE
TP10
(SYNC)
VR13
ZEBRA
ADJ
VR11
BURST GAIN
VR8
SUB-QUAD
VR16
QUAD
VR10
U CAN
VR9
V CAN
VR1
G INPUT
GAIN
VR13
G PULSE
CANCEL
VR16
G PEDEST
VR5
R INPUT
GAIN
VR14
R PULSE
CANCEL
VR17
P PEDEST
VR9
B INPUT
GAIN
VR15
B PULSE
CANCEL
VR18
B PEDEST

SYNC BOARD


VR11
FIELD ADJ
VR1
SYSTEM
BLANKING
TP1(G/L)
VR2
RESET
TIMING
ADJ
TP2(V RESET)
TP3
(3 FIELD)
CT1
INTER
LEAVING
TPE
(GND)
IC32
CT2
H.LOCK
1
2
15
16
CN1
IC19
C105
TP13
(28 MHz)
VR5
V.CP PHASE
VR9
H.PRE
BL WIDTH
VR7
CP PHASE
TP11
(CV SAMPLE)
TP6(VD)
R11
TP7
(C.S BL)
TP17
(BFP)
TP8
(SYNC)
31
32
VR10
SC/H
TP12(CP)
TP10(PRE BL)
VR8
V.PRE BL
WIDTH
VR6
C.P WIDTH
VR 4
V.CP WIDTH
TP14
(V.BL)
TP16
(PAL SQ)
TP15
(SC)
IC31
CT3
SC LOCK
TP9
(HD)
X3
4.43MHz
ADJ

CCD DRIVE BOARD


VR1
DLφH2
PHASE
VR2
DLφH2
WIDTH

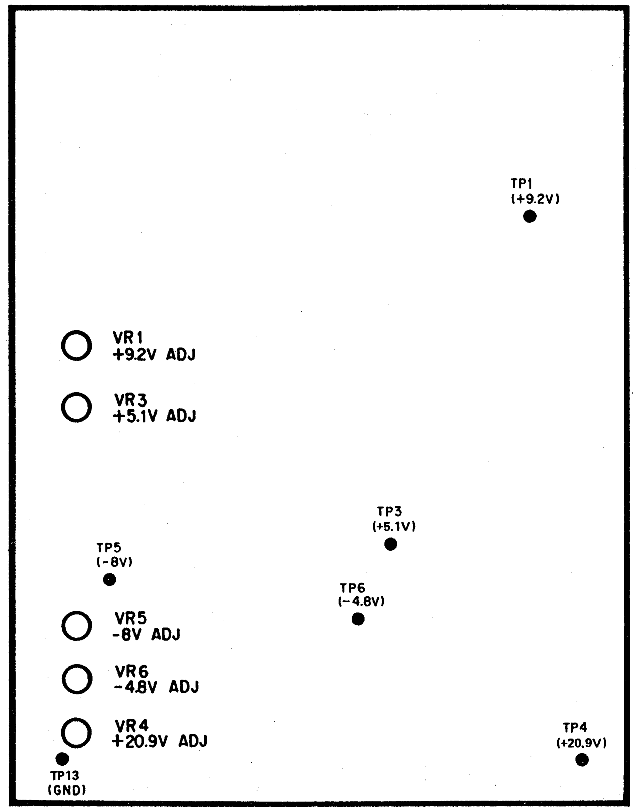
21V.
of the
on the

step) of
tern at
586V.

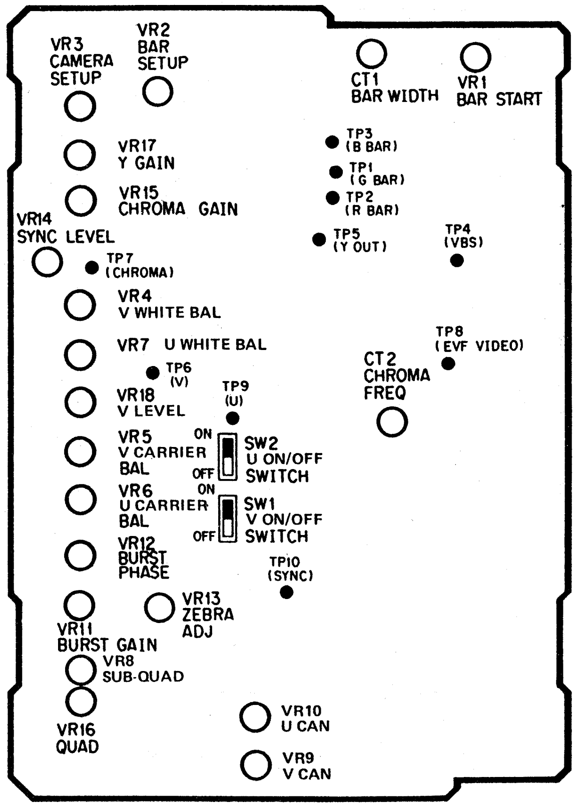
LOCATION OF TEST POINTS AND ADJUSTING CONTROLS — Component Side —

< Camera Head >

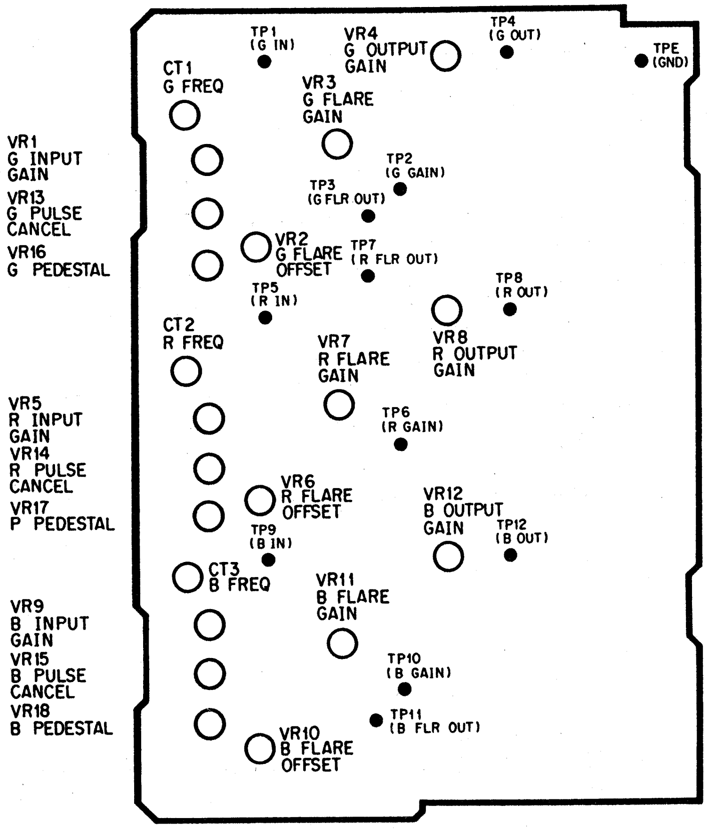
POWER BOARD


TP1
(+9.2V)
VR1
+9.2V ADJ
VR3
+5.1V ADJ
TP3
(+5.1V)
TP5
(-8V)
TP6
(-4.8V)
VR5
-8V ADJ
VR6
-4.8V ADJ
VR4
+20.9V ADJ
TP4
(+20.9V)
TP13
(GND)

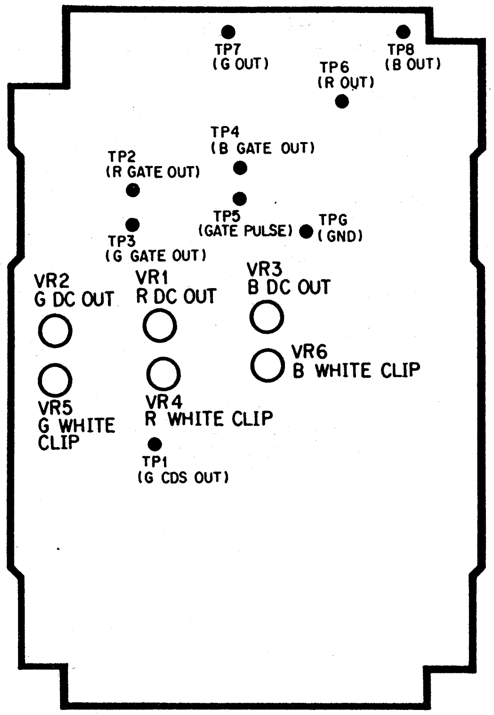
ENCODER BOARD


VR3
CAMERA
SETUP
VR2
BAR
SETUP
CT1
BAR WIDTH
VR1
BAR START
VR17
Y GAIN
TP3
(B BAR)
TP1
(G BAR)
TP2
(R BAR)
VR15
CHROMA GAIN
VR14
SYNC LEVEL
TP5
(Y OUT)
TP4
(VBS)
TP7
(CHROMA)
VR4
V WHITE BAL
VR7 U WHITE BAL
TP8
(EVF VIDEO)
CT2
CHROMA
FREQ
TP6
(V)
TP9
(U)
VR18
V LEVEL
VR5
V CARRIER
BAL
ON
OFF
SW2
U ON/OFF
SWITCH
VR6
U CARRIER
BAL
ON
OFF
SW1
V ON/OFF
SWITCH
VR12
BURST
PHASE
TP10
(SYNC)
VR13
ZEBRA
ADJ
VR11
BURST GAIN
VR8
SUB-QUAD
VR16
QUAD
VR10
U CAN
VR9
V CAN

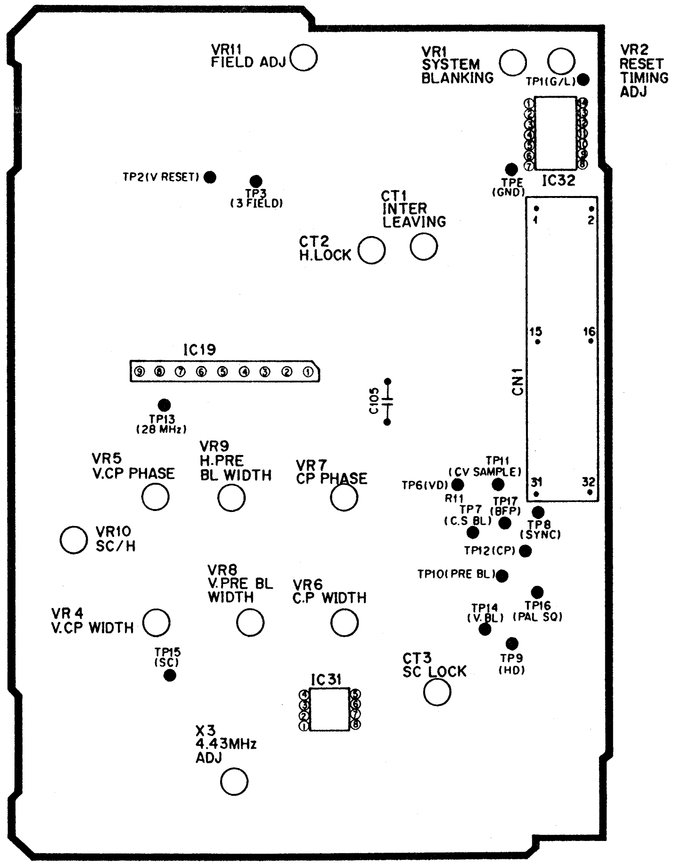
PROCESS-1 BOARD


TP1
(G IN)
VR4
G OUTPUT
GAIN
TP4
(G OUT)
TPE
(GND)
CT1
G FREQ
VR3
G FLARE
GAIN
VR1
G INPUT
GAIN
TP2
(G GAIN)
TP3
(G FLR OUT)
VR13
G PULSE
CANCEL
VR2
G FLARE
OFFSET
TP7
(R FLR OUT)
VR16
G PEDESTAL
TP5
(R IN)
TP8
(R OUT)
CT2
R FREQ
VR7
R FLARE
GAIN
VR8
R OUTPUT
GAIN
VR5
R INPUT
GAIN
TP6
(R GAIN)
VR14
R PULSE
CANCEL
VR6
R FLARE
OFFSET
VR12
B OUTPUT
GAIN
VR17
P PEDESTAL
TP9
(B IN)
TP12
(B OUT)
CT3
B FREQ
VR11
B FLARE
GAIN
VR9
B INPUT
GAIN
VR15
B PULSE
CANCEL
TP10
(B GAIN)
VR18
B PEDESTAL
TP11
(B FLR OUT)
VR10
B FLARE
OFFSET

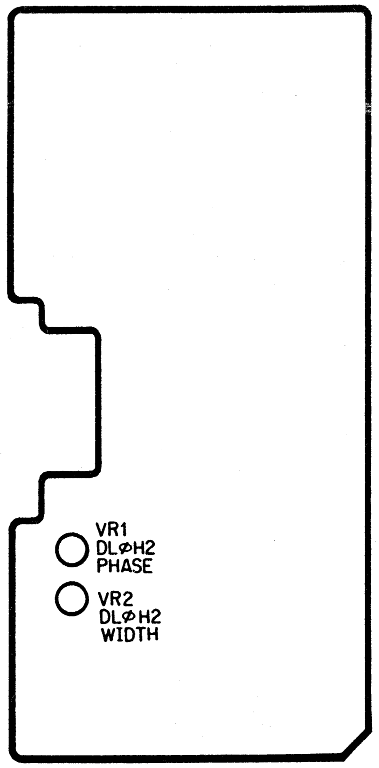
PREAMPLIFIER BOARD


TP7
(G OUT)
TP8
(B OUT)
TP6
(R OUT)
TP4
(B GATE OUT)
TP2
(R GATE OUT)
TP5
(GATE PULSE)
TPG
(GND)
TP3
(G GATE OUT)
VR2
G DC OUT
VR1
R DC OUT
VR3
B DC OUT
VR6
B WHITE CLIP
VR5
G WHITE
CLIP
VR4
R WHITE CLIP
TP1
(G CDS OUT)

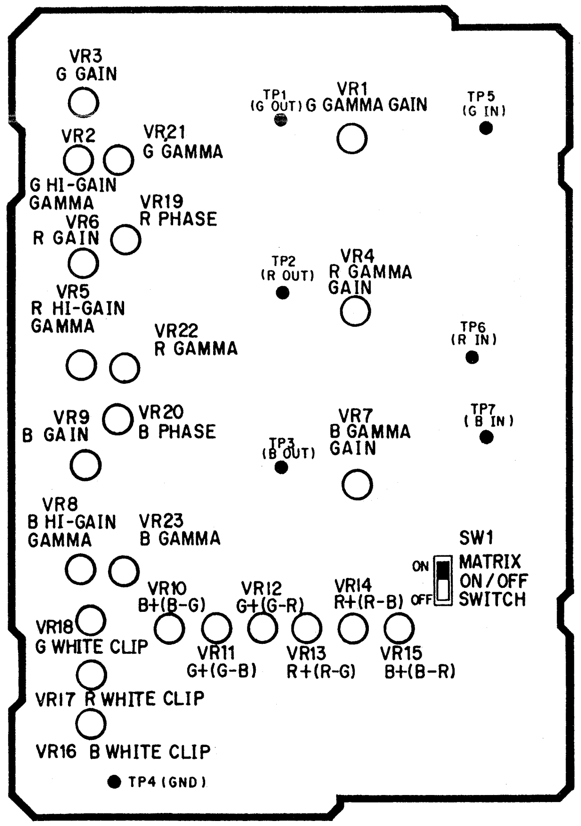
SYNC BOARD


VR11
FIELD ADJ
VR1
SYSTEM
BLANKING
VR2
RESET
TIMING
ADJ
TP1(G/L)
TP2(V RESET)
TP3
(3 FIELD)
TPE
(GND)
IC32
CT1
INTER
LEAVING
CT2
H.LOCK
IC19
C105
CN1
TP13
(28 MHz)
VR5
V.CP PHASE
VR9
H.PRE
BL WIDTH
VR7
CP PHASE
TP11
(CV SAMPLE)
TP6(VD)
R11
TP7
(C.S BL)
TP17
(BFP)
TP8
(SYNC)
TP12(CP)
VR10
SC/H
TP10(PRE BL)
VR8
V.PRE BL
WIDTH
VR6
C.P WIDTH
TP14
(V.BL)
TP16
(PAL SQ)
VR4
V.CP WIDTH
TP15
(SC)
TP9
(HD)
CT3
SC LOCK
IC31
X3
4.43MHz
ADJ

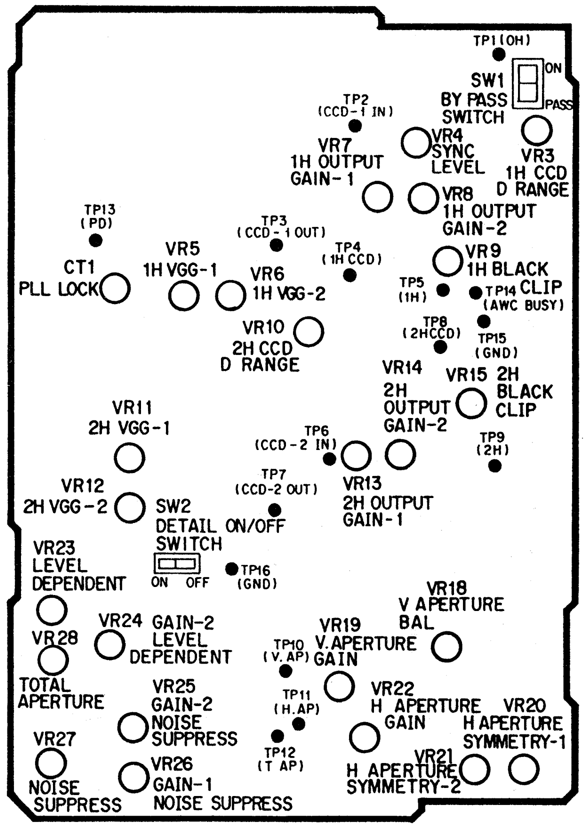
CCD DRIVE BOARD


VR1
DLφH2
PHASE
VR2
DLφH2
WIDTH

PROCESS-2 BOARD


VR3
G GAIN
TP1
(G OUT)
VR1
G GAMMA GAIN
TP5
(G IN)
VR2
VR21
G GAMMA
G HI-GAIN
GAMMA
VR19
R PHASE
VR6
R GAIN
TP2
(R OUT)
VR4
R GAMMA
GAIN
VR5
R HI-GAIN
GAMMA
VR22
R GAMMA
TP6
(R IN)
VR9
B GAIN
VR20
B PHASE
TP3
(B OUT)
VR7
B GAMMA
GAIN
TP7
(B IN)
VR8
B HI-GAIN
GAMMA
VR23
B GAMMA
SW1
ON
OFF
MATRIX
ON/OFF
SWITCH
VR10
B+(B-G)
VR12
G+(G-R)
VR14
R+(R-B)
VR18
G WHITE CLIP
VR11
G+(G-B)
VR13
R+(R-G)
VR15
B+(B-R)
VR17 R WHITE CLIP
VR16 B WHITE CLIP
TP4 (GND)

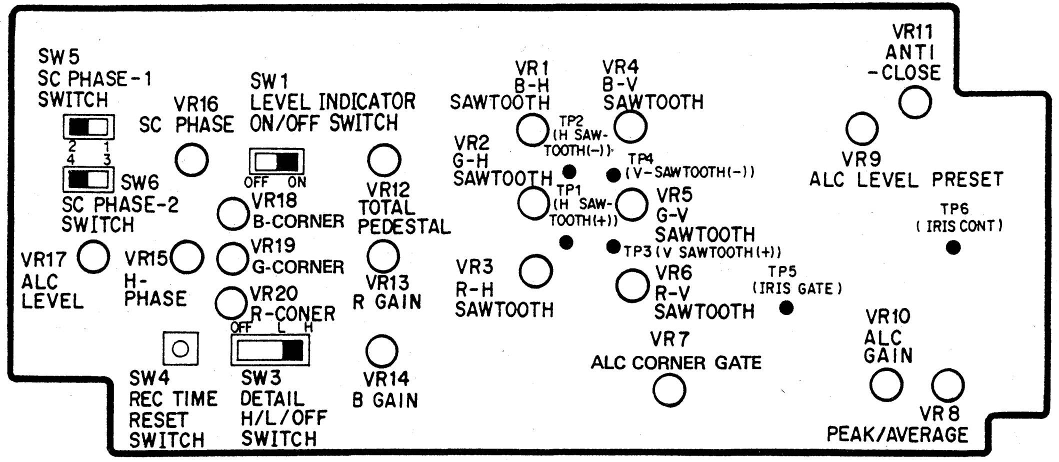
DETAIL BOARD


TP1(OH)
SW1
BY PASS
SWITCH
ON
PASS
TP2
(CCD-1 IN)
VR4
SYNC
LEVEL
VR3
1H CCD
D RANGE
VR7
1H OUTPUT
GAIN-1
VR8
1H OUTPUT
GAIN-2
TP13
(PD)
TP3
(CCD-1 OUT)
TP4
(1H CCD)
VR9
1H BLACK
CLIP
CT1
PLL LOCK
VR5
1H VGG-1
VR6
1H VGG-2
TP5
(1H)
TP14
(AWC BUSY)
VR10
2H CCD
D RANGE
TP8
(2HCCD)
TP15
(GND)
VR14
2H
OUTPUT
GAIN-2
VR15 2H
BLACK
CLIP
VR11
2H VGG-1
TP6
(CCD-2 IN)
TP9
(2H)
VR12
2H VGG-2
TP7
(CCD-2 OUT)
VR13
2H OUTPUT
GAIN-1
SW2
DETAIL ON/OFF
SWITCH
ON OFF
TP16
(GND)
VR23
LEVEL
DEPENDENT
VR18
V APERTURE
BAL
VR24 GAIN-2
LEVEL
DEPENDENT
VR28
VR19
V.APERTURE
GAIN
TP10
(V.AP)
TOTAL
APERTURE
VR25
GAIN-2
NOISE
SUPPRESS
TP11
(H.AP)
VR22
H APERTURE
GAIN
VR20
H APERTURE
SYMMETRY-1
VR27
TP12
(T AP)
VR21
H APERTURE
SYMMETRY-2
NOISE
SUPPRESS
VR26
GAIN-1
NOISE SUPPRESS

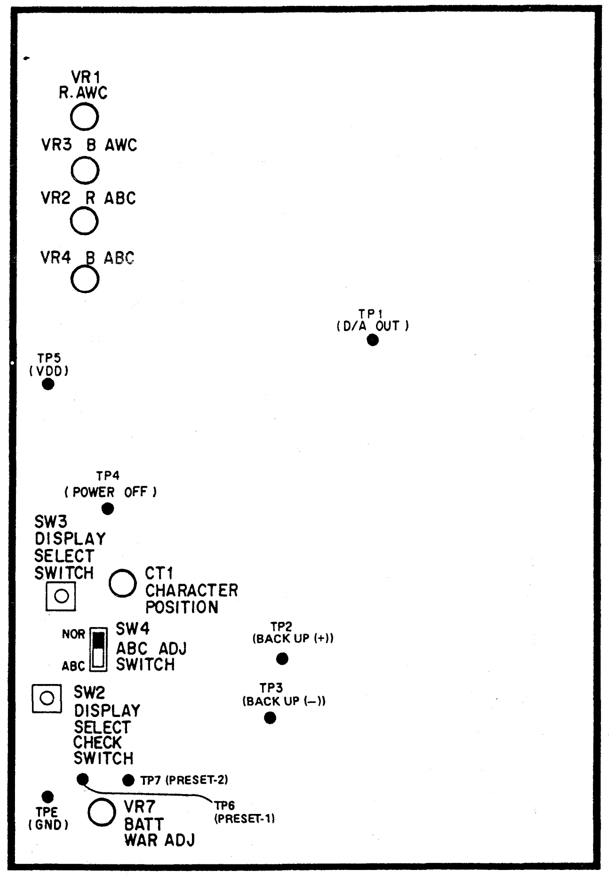
LOCATION OF TEST POINTS AND ADJUSTING CONTROLS — Component Side —

< Camera Head >

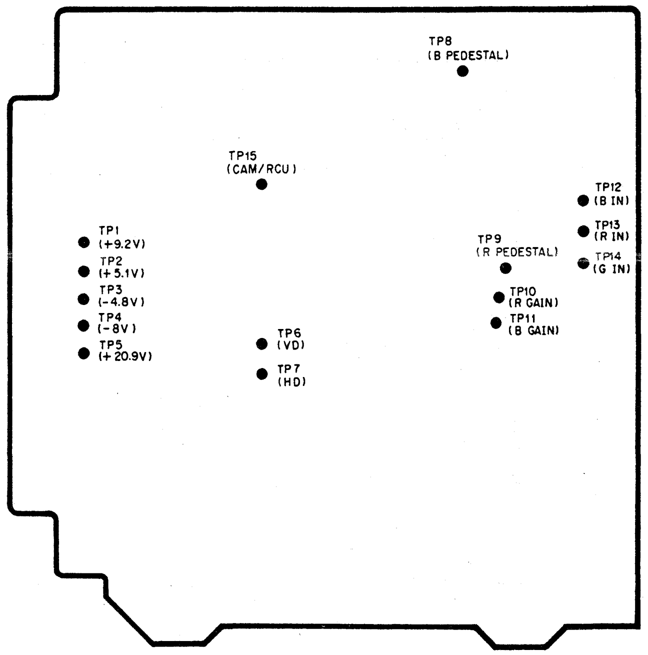
SHADING BOARD


SW5
SC PHASE-1
SWITCH
2 1
4 3
SW6
SC PHASE-2
SWITCH
VR16
SC PHASE
SW1
LEVEL INDICATOR
ON/OFF SWITCH
OFF ON
VR17
ALC
LEVEL
VR15
H-
PHASE
VR18
B-CORNER
VR19
G-CORNER
VR20
R-CONER
OFF L H
VR12
TOTAL
PEDESTAL
VR13
R GAIN
VR14
B GAIN
SW4
REC TIME
RESET
SWITCH
SW3
DETAIL
H/L/OFF
SWITCH
VR1
B-H
SAWTOOTH
VR4
B-V
SAWTOOTH
TP2
(H SAW-
TOOTH(-))
VR2
G-H
SAWTOOTH
TP4
(V-SAWTOOTH(-))
TP1
(H SAW-
TOOTH(+))
VR5
G-V
SAWTOOTH
TP3 (V SAWTOOTH(+))
VR3
R-H
SAWTOOTH
VR6
R-V
SAWTOOTH
TP5
(IRIS GATE)
VR7
ALC CORNER GATE
VR11
ANTI
-CLOSE
VR9
ALC LEVEL PRESET
TP6
(IRIS CONT)
VR10
ALC
GAIN
VR8
PEAK/AVERAGE

AUTO BOARD

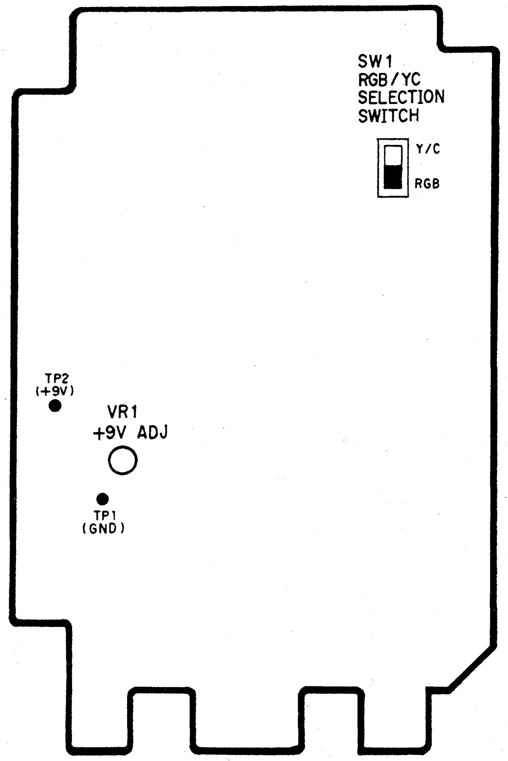

VR1
R.AWC
VR3 B AWC
VR2 R ABC
VR4 B ABC
TP1
(D/A OUT)
TP5
(VDD)
TP4
(POWER OFF)
SW3
DISPLAY
SELECT
SWITCH
CT1
CHARACTER
POSITION
NOR
ABC
SW4
ABC ADJ
SWITCH
TP2
(BACK UP (+))
SW2
DISPLAY
SELECT
CHECK
SWITCH
TP3
(BACK UP (–))
TP7 (PRESET-2)
TPE
(GND)
VR7
BATT
WAR ADJ
TP6
(PRESET-1)

MOTHER BOARD


TP8
(B PEDESTAL)
TP15
(CAM/RCU)
TP12
(B IN)
TP13
(R IN)
TP14
(G IN)
TP9
(R PEDESTAL)
TP10
(R GAIN)
TP11
(B GAIN)
TP1
(+9.2V)
TP2
(+5.1V)
TP3
(-4.8V)
TP4
(-8V)
TP5
(+20.9V)
TP6
(VD)
TP7
(HD)

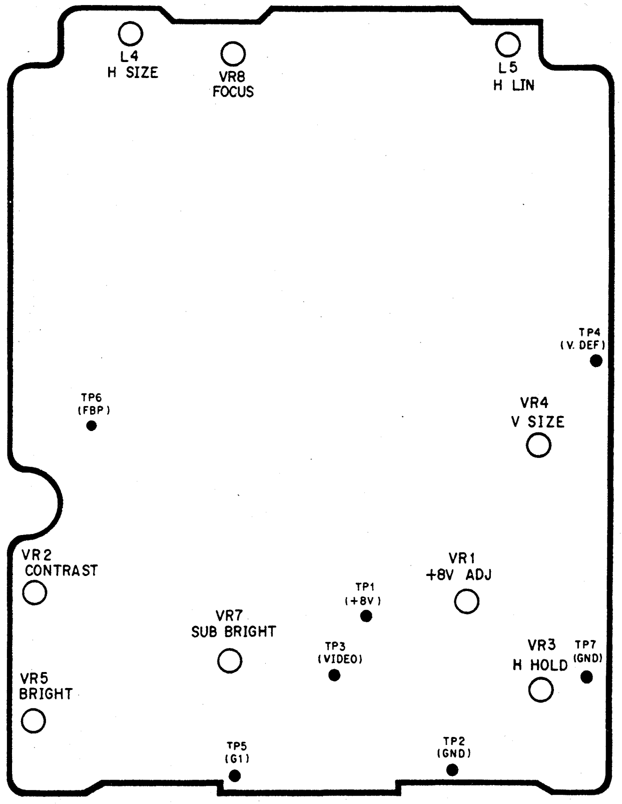
< Camera Adaptor >

MAIN BOARD


SW1
RGB/YC
SELECTION
SWITCH
Y/C
RGB
TP2
(+9V)
VR1
+9V ADJ
TP1
(GND)

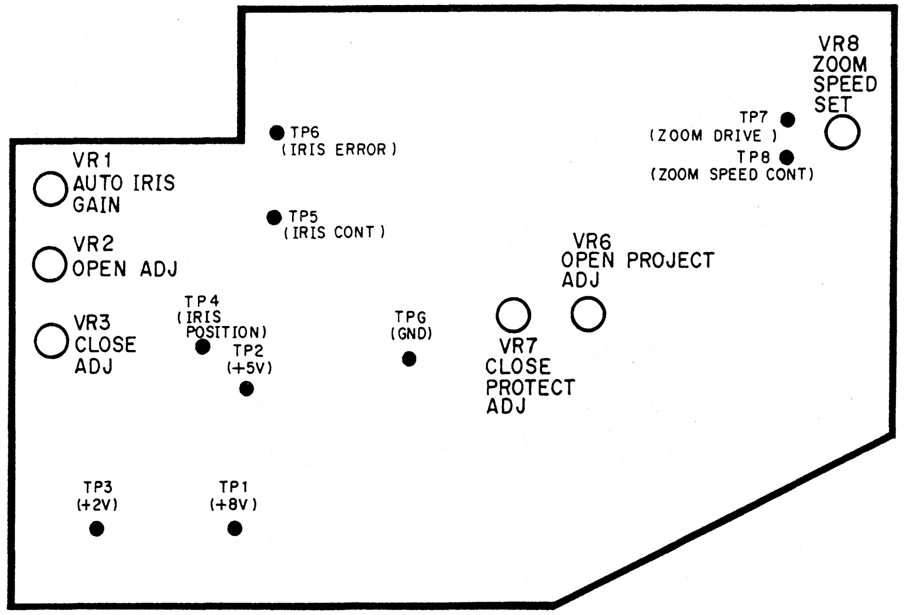
<1.5" Electronic Viewfinder WV-VF38>

MAIN BOARD

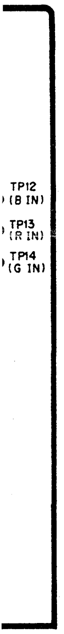

L4
H SIZE
VR8
FOCUS
L5
H LIN
TP4
(V. DEF)
TP6
(FBP)
VR4
V SIZE
VR2
CONTRAST
VR1
+8V ADJ
TP1
(+8V)
VR7
SUB BRIGHT
TP3
(VIDEO)
VR3
H HOLD
TP7
(GND)
VR5
BRIGHT
TP5
(G1)
TP2
(GND)

<12X Servo Control Zoom Lens>

DRIVE AMP BOARD

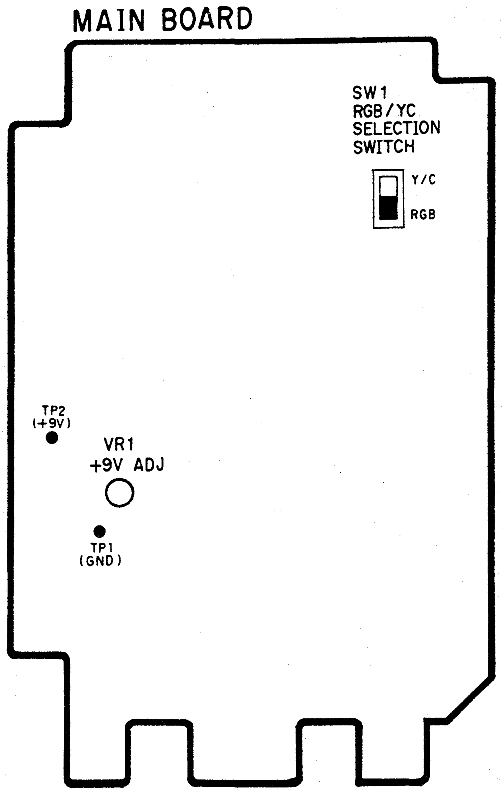

VR8
ZOOM
SPEED
SET
TP7
(ZOOM DRIVE)
TP8
(ZOOM SPEED CONT)
TP6
(IRIS ERROR)
VR1
AUTO IRIS
GAIN
TP5
(IRIS CONT)
VR2
OPEN ADJ
VR6
OPEN PROJECT
ADJ
TP4
(IRIS
POSITION)
TP2
(+5V)
TPG
(GND)
VR3
CLOSE
ADJ
VR7
CLOSE
PROTECT
ADJ
TP3
(+2V)
TP1
(+8V)

NOTE: VR1, VR2, VR3 are located on pattern side of the drive amp board.

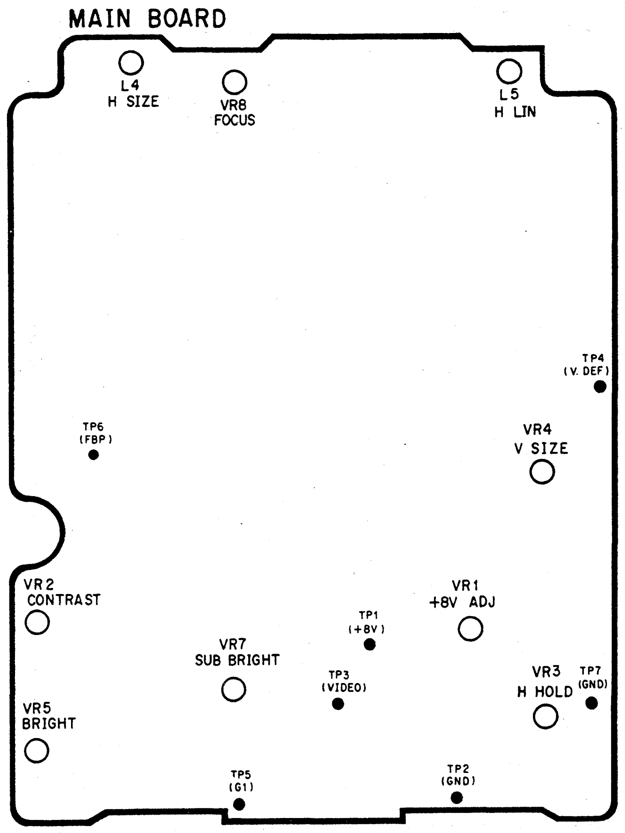

TP12
(B IN)
TP13
(R IN)
TP14
(G IN)

— Component Side —

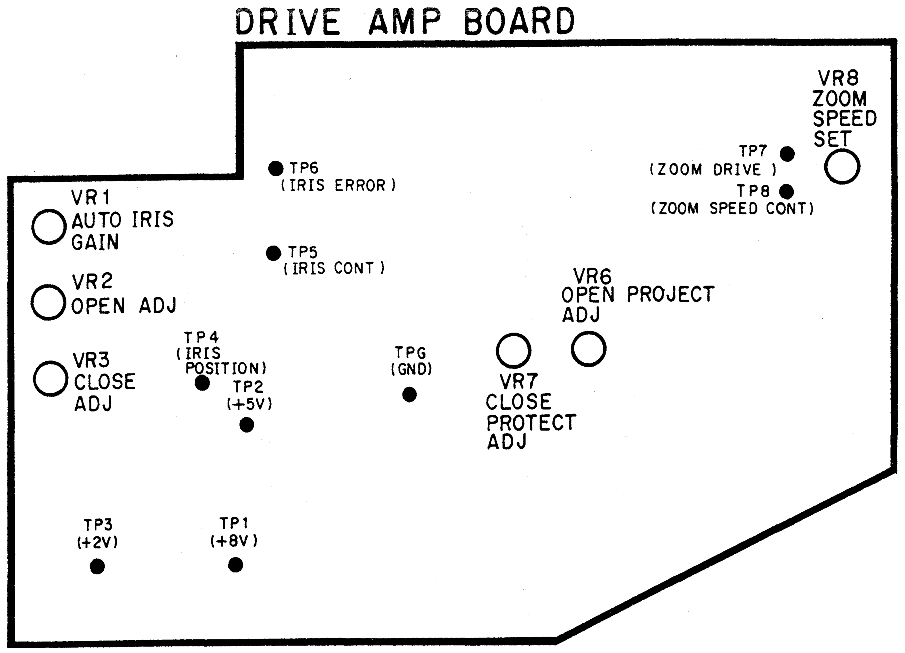
< Camera Adaptor >


MAIN BOARD
SW1
RGB/YC
SELECTION
SWITCH
Y/C
RGB
TP2
(+9V)
VR1
+9V ADJ
TP1
(GND)

<1.5" Electronic Viewfinder WV-VF38>


MAIN BOARD
L4
H SIZE
VR8
FOCUS
L5
H LIN
TP4
(V. DEF)
TP6
(FBP)
VR4
V SIZE
VR2
CONTRAST
VR1
+8V ADJ
TP1
(+8V)
VR7
SUB BRIGHT
TP3
(VIDEO)
VR3
H HOLD
TP7
(GND)
VR5
BRIGHT
TP5
(G1)
TP2
(GND)

<12X Servo Control Zoom Lens>


DRIVE AMP BOARD
VR8
ZOOM
SPEED
SET
TP7
(ZOOM DRIVE)
TP8
(ZOOM SPEED CONT)
TP6
(IRIS ERROR)
VR1
AUTO IRIS
GAIN
TP5
(IRIS CONT)
VR2
OPEN ADJ
VR6
OPEN PROJECT
ADJ
TP4
(IRIS
POSITION)
TP2
(+5V)
TPG
(GND)
VR3
CLOSE
ADJ
VR7
CLOSE
PROTECT
ADJ
TP3
(+2V)
TP1
(+8V)

NOTE: VR1, VR2, VR3 are located on pattern side of the drive amp board.

■ Shading Board Adjustment

(55) ALC gate adjustment

Test points :	VIDEO OUT connector	
	TP5 (IRIS GATE)	Shading board
Adjust:	VR7	Shading board
	(ALC CORNER GATE)	

- Set the filter wheel to 1 (3200°K) position.
- Aim the camera at the white chart.
- Set the lens iris to fully open position.
- Connect the oscilloscope to TP5 and VIDEO OUT connector.
- Trigger the oscilloscope at V rate using TP6 (VD) on Mother board.
- Adjust VR7 so that the rising edge of the ALC gate pulse at TP5 lags 4msec ±0.5 msec. from the end of the vertical blanking.

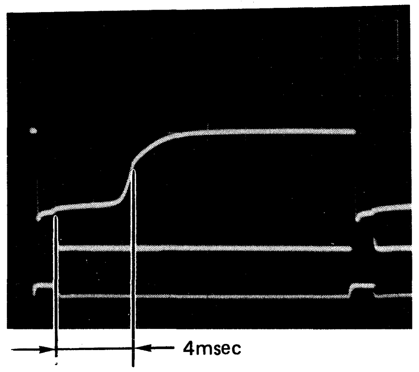


Fig. 4-2-70

(56) ALC adjustment

Adjusts :	VR8 (PEAK/AVERAGE)	Shading board
	VR10 (ALC GAIN)	Shading board
	VR17 (ALC LEVEL)	Shading board
	VR9 (ALC LEVEL PRESET)	Shading board
	VR11 (ANTI-CLOSE)	Shading board
Observe :	Waveform monitor	

- Aim the camera at the gray scale chart so that the chart fully occupies the raster.
- Set the lens iris to A (AUTO) position.
- Set VR8 to fully clockwise (AVERAGE) position.
- Set VR17 to the 11 o'clock position.
- Adjust VR10 to counterclockwise direction until the lens iris start hunting and stop it at where the lens iris just before start hunting.
- Adjust VR9 for 0.7V on the waveform monitor.
- Aim the camera at a very bright object so that the lens iris becomes almost CLOSE position.
- Adjust VR11 so that the lens iris becomes F16.
- Repeat adjusting VR10, VR9 and VR11 so that the video level is 100 % and no lens iris hunting when the gray scale chart is aimed in full shot.

■ Auto Board Adjustment

(57) Character size adjustment

Adjust:	CT1 (CHARACTER POSITION)	Auto board
Observe :	1.5" viewfinder	

- Press the Check button (CHECK) on the left side of camera and character on the 1.5" viewfinder screen.
- Adjust CT1 so that the both side spaces between character and screen edges become equal (A).

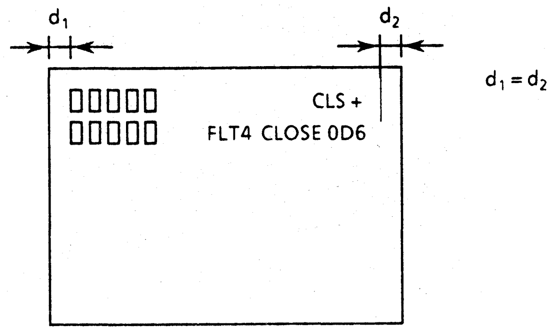

d_1
d_2
$d_1 = d_2$
00000
00000
CLS +
FLT4 CLOSE 0D6

Fig. 4-2-71

(58) Battery warning adjustment

Test point :	+ DC OUT of DC Power Supply	
Adjust :	VR7 (BATT WAR ADJ)	Auto board
Observe :	Viewfinder	

- Connect the digital voltmeter probe between + DC OUT of DC Power Supply and the ground.
- Disconnect the AC adaptor from the camera.
- Supply + 12V DC between pin 4 and pin 1 (GND) of External DC Input Connector (EXT DC) or the rear of the camera from the DC Power Supply.

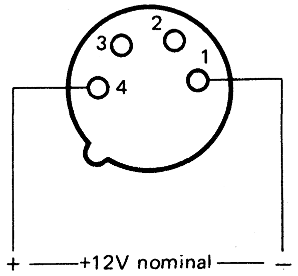

2
3
1
4
+
+12V nominal
−

Fig. 4-2-72

- Set the DC Power Supply voltage so that the voltage is 10.6V.
- Press the Check button (CHECK) on the left side of the camera and character on the viewfinder screen.
- Turn VR7 fully counterclockwise and turn it back slowly and stop it when the battery warning character (BATT) in the viewfinder screen just blinks.
- Confirm that the battery warning character disappears when the DC Power Supply voltage is 10.7V.

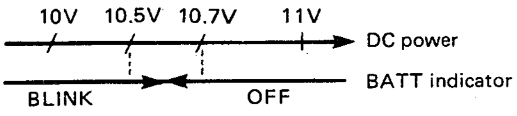


Fig. 4-2-73

- Disconnect the DC Power Supply from the EXT DC of the camera.
- Mount the AC adaptor to the camera.

(59) Auto white control and auto black control adjustment

Adjusts :	VR1 (R AWC)	Auto board
	VR2 (R ABC)	Auto board
	VR3 (B AWC)	Auto board
	VR4 (B ABC)	Auto board
Observe :	Vectorscope	

- Set the filter wheel to 4 (CLOSE) position.
- Set the SW4 (ABC ADJ SWITCH) on the Auto board to ABC position.
- Set the gain of vectorscope to maximum.
- Adjust VR2 and VR4 so that the vector position at the center of the vectorscope.
- Set the SW4 to NORMAL position.
- Aim the camera at the logarithmic gray scale chart.
- Set the White Balance Selection Switch to A or B of AWC position.
- Press up the Auto White/Auto Black Set Switch on the front of camera to AWC position frequently and then adjust VR1 and VR3 so that the vector position at the center of the vectorscope.

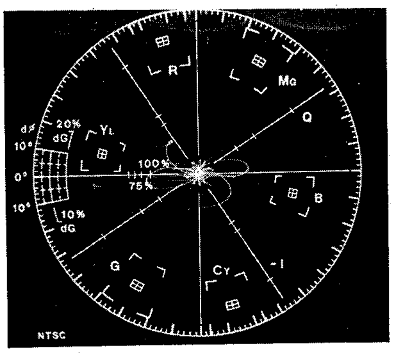


Fig. 4-2-74

4-3 1.5" Viewfinder WV-VF38

- The camera must be completely aligned before viewfinder adjustment is made.
- Disassemble the 1.5" Viewfinder WV-VF38 while referring to 2-2 1.5" Viewfinder WV-VF38 on page 2-3.
- Refer to the separate booklet for the Test Points and Adjusting Controls.
- Connect the 1.5" Viewfinder WV-VF38 to the viewfinder connector on the camera head.

Connection

- Connect the coaxial cable between the VIDEO OUT connector on the right side (viewed from rear) of camera adaptor and the VIDEO IN connector of the color video monitor.
- Connect the coaxial cable between the VIDEO OUT connector of the color video monitor and VIDEO IN connector of the underscanned black and white video monitor.
- Terminate the video input of the underscanned black and white video monitor with 75 ohms.

Setup

- Turn on the camera for warm up at least 30 minutes prior to adjustment.
- Distance between the camera and test chart should be 3m.
- Lighting : 2000 lux, incident, 3200°K

Position of Controls and Switches on the Camera

<Left Side> Viewed from rear

• Filter Wheel	1
• High Gain Selection Switch	0 dB
• Color Bar/Camera Selection Switch	CAM
• White Balance Selection Switch	P SET
• Power Switch	ON

<Inside Setup Panel>

• T PED	Center
• R GAIN	Center
• B GAIN	Center
• Detail Level Selection Switch	OFF
• H PHASE	Center
• SC PHASE	Center
• Lens Iris Control	11 o'clock
• Level Indicator ON/OFF Switch	ON

<Front>

• Auto White/Auto Black Set Switch	HOLD
• Lens iris Selection Switch	NOR

<Right Side> Viewed from rear

• Power Selector Switch	BATT/EXTDC

<Lens>

- Iris Control Selection Switch .... A (Auto)

Position of Controls and Switches on the 1.5" Viewfinder

BRIGHT	Center
CONTRAST	Center
Peaking ON/OFF Switch	OFF
Tally ON/OFF Switch	ON

(1) +8V adjustment

Test point:	TP1 (+8V)
Adjust:	VR1 (+8V ADJ)

- Connect the digital voltmeter probe to TP1.
- Adjust VR1 for 8.0V ± 0.05V.

(2) Horizontal hold adjustment

Adjust:	VR3 (H HOLD)
Observe:	Viewfinder

- Adjust VR3 so that the picture is held horizontally.

(3) Focus adjustment

Adjust:	VR8 (FOCUS)
Observe:	Viewfinder

- Aim the camera at the resolution chart.
- Adjust the lens focus for best resolution on the monochrome underscanned video monitor.
- Adjust VR8 for best resolution in the viewfinder screen.

(4) Centering magnets adjustment

Adjust:	Centering magnets
Observe:	Viewfinder

- Reduce the picture side using VR4 (V SIZE) and L4 (H SIZE) so that the entire raster is observed on the viewfinder.
- Aim the camera at the registration chart.
- Adjust the centering magnets so that the raster comes the center of viewfinder screen.

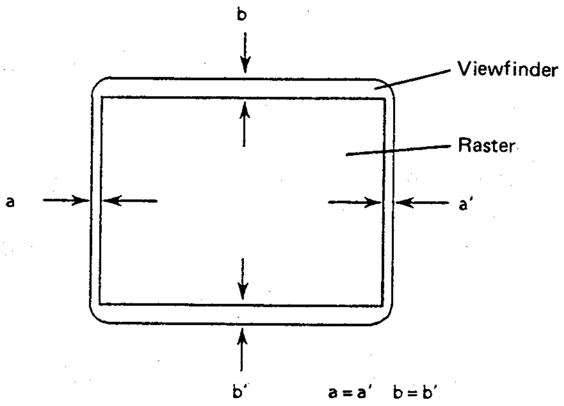


Fig. 4-3-1

(5) Picture tilte adjustment

Adjust:	Deflection coil
Observe:	Viewfinder

- Loosen the deflection coil holding screw.
- Observe the viewfinder and turn the deflection coil so that the raster is straight.
- Tighten the deflection coil holding screw.

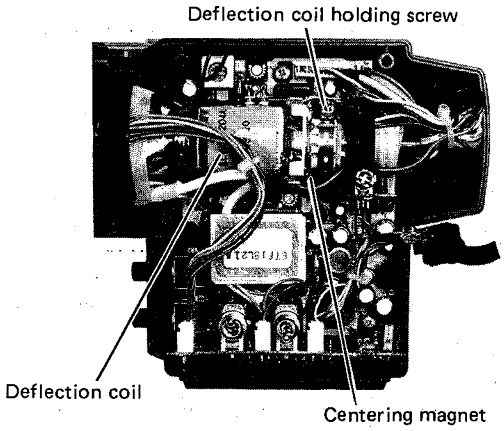


Fig. 4-3-2

(6) Horizontal and vertical size adjustment

Adjusts:	VR4 (V SIZE) L4 (H SIZE) L5 (H LIN)
Observe:	Viewfinder

- Aim the camera at the ball chart.
- Adjust L5 so that the circle in the chart is as really a true circle as possible.
- Adjust L4 and stop just before horizontal edges of raster touching to the both edges of viewfinder screen.

- Adjust VR4 so that the circle in the chart is as true circle as possible.
- Confirm that the four corner of raster are observed on the viewfinder. If not, readjust the centering magnets.

(7) Vertical blanking adjustment

Test point: TP5 (G1)
Adjust: VR6 (V BLANKING)

- Set VR2 (CONTRAST) fully clockwise and VR5 (BRIGHT) fully counterclockwise.
- Connect the oscilloscope to TP5.
- Trigger the oscilloscope at V rate using TP6 (VD) on Mother board of camera head.
- Expand the V blanking period using the delayed sweep mode of oscilloscope.
- Adjust VR6 so that the V blanking width becomes 0.96ms ± 0.02ms.

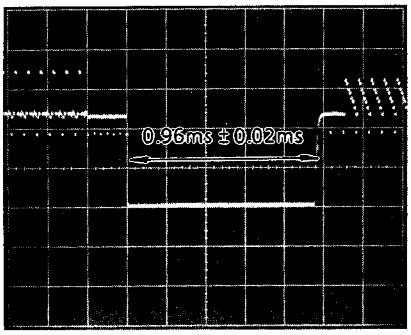


Fig. 4-3-3

(8) Subbrightness adjustment

Adjust: VR7 (SUB-BRIGHT)
Observe: Viewfinder

- Close the lens or set the filter wheel to the position 4.
- Set VR2 (CONTRAST) fully clockwise and VR5 (BRIGHT) fully counterclockwise.
- Adjust VR7 so that the raster at the point where becomes the brightest but the retrace line is not appear.

(9) Contrast and brightness adjustment

Adjusts: VR2 (CONTRAST)
VR5 (BRIGHT)
Observe: Viewfinder

- Aim the camera at the logarithmic gray scale chart.
- Set the Iris Control Selection Switch to M (Manual) position.
- While changing the lens iris from the closed position to F5.6, adjust VR2 and VR5 so that the black-and-white chip gradations will be the same on the viewfinder as that in the monitor.

4-4 Camera Adaptor Adjustment

- The camera must be completely aligned before Camera Adaptor adjustment is made.
- Disassemble the Camera Adaptor while referring to 2-3 Camera Adaptor on page 2-4.
- Refer to the separate booklet for the Test Points and Adjusting Controls.
- Connect the Camera Adaptor to the camera head.
- Connect the camera and the remote control unit (RCU) using 32 pin camera cable 32A-25.

Position of Controls and Switches on the Camera

<Left Side> Viewed from rear

• Filter Wheel	1
• High Gain Selection Switch	0 dB
• Color Bar/Camera Selection Switch	BAR
• White Balance Selection Switch	P SET
• Power Switch	ON

<Inside Setup Panel>

• T PED	Center
• R GAIN	Center
• B GAIN	Center
• Detail Level Selection Switch	OFF
• H PHASE	Center
• SC PHASE	Center
• Lens Iris Control	11o'clock
• Level Indicator ON/OFF Switch	ON

<Front>

• Auto White/Auto Black Set Switch	HOLD

<Right Side> Viewed from rear

• Power Selector Switch	VCR/RCU

<Lens>

• Iris Control Selection Switch	A (Auto)

Position of Controls and Switches on the RCU

• Power Switch	ON
• High Gain Selection Switch	0 dB
• Auto White/Auto Black Set Switch	HOLD
• White/Black Balance Selection Switch	MANUAL
• R GAIN	Center
• B GAIN	Center
• Detail ON/OFF Switch	OFF
• Cable Length Compensation Switch	50m (150ft)
• Intercom Level Control	Center
• Color Bar/Camera Selection Switch	BAR
• H PHASE	Center
• SC PHASE FINE	Center
• SC Phase Coarse Switch	0°

- TOTAL PEDESTAL .... Center
- R PEDESTAL .... Center
- B PEDESTAL .... Center
- Y ADJUST .... Center
- CHROMA ADJUST .... Center
- Lens Iris Control .... AUTO

(1) +9V adjustment

Test point: TP2 (+9V)
Adjust: VR1 (+9V ADJ)

- Connect the digital voltmeter to TP2.
- Adjust VR1 for 9V ± 0.05V.

4-5 Lens Adjustment

- The camera must be completely aligned before 12X Servo Control Lens J12X10BKRSM adjustment is made.
- Disassemble the 12X Servo Control Lens J12X10BKRSM while referring to 2-4 12X Servo Control Lens J12X10BKRSM on page 2-4.
- Refer to the separate booklet for the Test Points and Adjusting Controls.
- Mount the 12X Servo Control Lens J12X10BKRSM to lens mount on the camera head.

(1) Flangeback adjustment

Adjust: Flangeback adjustment ring
Observe: Black and white monitor

- Loosen flangeback lock knob which hold the flangeback adjustment ring.
- Aim the camera at the dark object further than 6 feet (2m) from the camera.
- Set the Iris Control Selection Switch to M (Manual) position and lens iris to F1.7.
- Zoom in close up/telephoto and adjust the focus by turning the lens focus.
- Zoom out (wide angle) and adjust the focus by turning the flangeback adjustment ring.
- Repeat this procedure until focus tracks through the zoom lens.
- Set the iris Control Selection Switch to A (Auto) position.

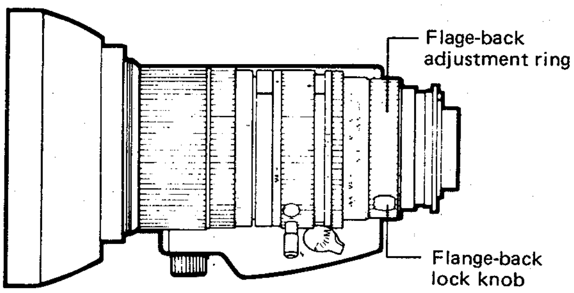


Fig. 4-5-1

(2) Iris open and close adjustment

Adjusts: VR2 (OPEN ADJ)
VR3 (CLOSE ADJ)

Note: **This adjustment has to be made only when the Remote Control Unit (RCU) WV-RC36 is connected to the camera WV-F200.**

- Connect the 32 pin VTR/RCU connector on the rear of camera to the 32 pin Camera cable connector on the rear of the Remote Control Unit (RCU) WV-RC36 using 32 pin camera cable.
- Set the Iris Control Selection Switch on the lens to A (Auto) position.
- Set the Lens Iris Control on RCU to the OPEN position.
- Adjust VR2 so that the lens iris becomes fully open position.
- Set the Lens Iris Control on RCU to the CLOSE position.
- Adjust VR3 so that the lens iris becomes fully close position.
- Repeat these steps until the each iris position becomes fully open or close position.

(3) Iris protect adjustment

Adjust: VR6 (OPEN PROTECT ADJ)
VR7 (CLOSE PROTECT ADJ)

- Keep the 32 pin cable connected as in the preceding step.
- Set the iris Control Selection Switch on the lens to A (Auto) position.
- Set the Lens Iris Control on RCU to the OPEN position.
- Adjust VR6 so that the lens iris is between F1.7 and fully open position.
- Set the Lens Iris Control on RCU to the CLOSE position.
- Adjust VR7 so that the lens iris is between C and fully close position.
- Repeat these steps until the each iris position is between F1.7 and fully open and C and fully close position.

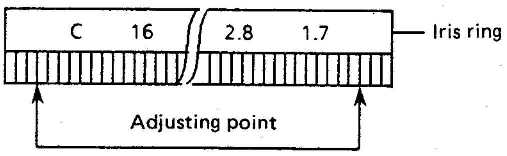


Fig. 4-5-2

(4) Iris gain adjustment

Adjust : VR1 (AUTO IRIS GAIN)

- Keep the 32 pin cable connected as in the preceding step.
- Set the Iris Control Selection Switch on the lens to A (Auto) position.
- Set the Lens Iris Control on RCU to the AUTO position.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to VIDEO OUT connector.
- Trigger the oscilloscope at H rate using TP7 (HD) on Mother board.
- Adjust VR1 so that the waveform from the bottom level to the top step of the logarithmic gray scale waveform becomes 1.0Vp-p.

(5) Zoom speed adjustment

Adjust : VR8 (ZOOM SPEED SET)

- Keep the 2 pin cable connected as in the preceding step.
- Set the Servo/Manual Zoom Selection Switch on the Lens to SERVO position.
- Press the Servo Zoom Control to zoom in (close up/telephoto) position.
- press the Servo Zoom Control to zoom out (wide angle) position and note the zoom speed A from zoom in to zoom out.
- Adjust VR8 so that zoom speed A from zoom in to zoom out is 3.4 sec ± 0.15 sec.

5. ADJUSTMENT PROCEDURE-2

When individual printed circuit board is replaced, following adjustments shows "○" mark items are required checking or readjusting.
NOTE: All following replacement indivisual Printed Circuit Boards are preadjusted from factory.

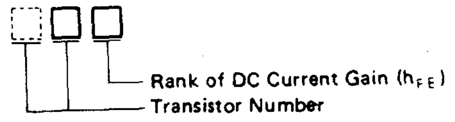
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
POWER	○																													
SYNC		○	○	○	○	○									○	○	○	○	○											
ENCODER									○	○	○	○	○	○	○	○	○	○	○											
PROCESS-1																									○		○	○	○	
PROCESS-2																														○
DETAIL																														
AUTO																														

	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)	(47)	(48)	(49)	(50)	(51)	(52)	(53)	(54)	(55)	(56)	(57)	(58)	(59)
POWER																													
SYNC																													
ENCODER																													
PROCESS-1	○																	○	○	○			○						○
PROCESS-2		○	○															○	○	○	○	○							○
DETAIL														○	○	○	○	○	○	○									
AUTO																													○

6. CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters or one numerical and two alphabet letters.


Rank of DC Current Gain (h_{FE})
Transistor Number

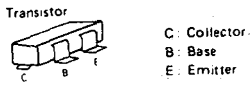
Transistor Number

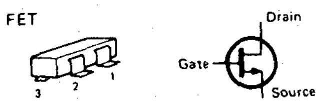
Letter	Transistor No.	Letter	Transistor No.
A	2SB709	X	2SD602A
B	2SB709A	Y	2SD601
C	2SB710	Z	2SD601A
D	2SB710A	1Z	2SD1030
E	2SA1022	1N	2SK199
F	2SA1034	1O	2SK198
H	2SA1035	1A	2SB799
I	2SB792	1B	2SB814
K	2SC2778	1C	2SB902
P	2SD814	1F	2SK321
Q	2SD813	1L	2SK247
R	2SC2480	1K	2SK316
S	2SC2405	1M	2SJ84
T	2SC2406	1T	2SC3077
U	2SC2404	1X	2SC2845
V	2SC2295	2B	2SK374
W	2SD602	2C	2SK116

Example

WQ → 2SD602 – Q
YQ → 2SD601 – Q
1BS → 2SB814 – S

Appearance and Symbols

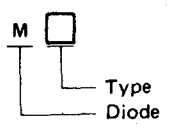

Transistor
C
B
E
C : Collector
B : Base
E : Emitter


FET
3
2
1
Drain
Gate
Source

	1	2	3
Except 2SK199	Drain	Source	Gate
2SK199	Gate	Drain	Source

2. Chip Diode

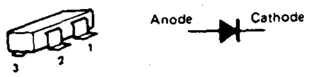
The diode number is indicated on the top surface of the chip diode using Two alphabet letters.


M
Type
Diode

Diode Number

Letter	Diode No.	Letter	Diode No.
MA	MA151A	MI	MA152K
MB	MA152A	MK	MA28W-B
MC	MA153	ML	MA28T-A
MD	MA28-A	MN	MA151WA
ME	MA28-B	MO	MA152WA
MF	MA28W-A	MT	MA151WK
MH	MA151K	MU	MA152WK

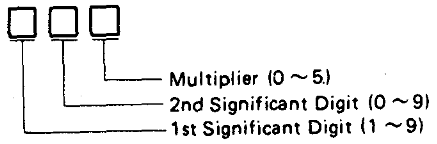
Appearance and Symbols


Anode
Cathode
3
2
1

	1	2	3
MA28/28W/28T	–	Anode	Cathode
MA151K/152K	–	Anode	Cathode
MA151A/152A	–	Cathode	Anode
MA151WK/MA152WK	Anode	Anode	Cathode
MA151WA/MA152WA	Cathode	Cathode	Anode
MA153	Cathode	Anode	Common

3. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.


Multiplier (0 ~ 5)
2nd Significant Digit (0 ~ 9)
1st Significant Digit (1 ~ 9)

EXAMPLE:

330 → 33×10^0 = 33 ohms
561 → 56×10^1 = 560 ohms
123 → 12×10^3 = 12 kohms

Note: Zero ohm resistor (jumper chip) is colored red or green.

4. Chip Capacitor

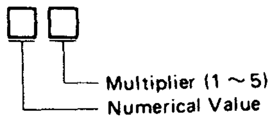
The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

EXAMPLE:

0.5 → 0.5 pF   2.5 → 2.5 pF
75 → 0.75 pF   33 → 33 pF
1 → 1 pF   82 → 82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.


Multiplier (1 ~ 5)
Numerical Value

Numerical Value

Letter	Value	Letter	Value
A	10	N	33
B	11	P	36
C	12	Q	39
D	13	R	43
E	15	S	47
F	16	T	51
G	18	U	56
H	20	V	62
J	22	W	68
K	24	X	75
L	27	Y	82
M	30	Z	91

• Letters I and O are not used

EXAMPLE:

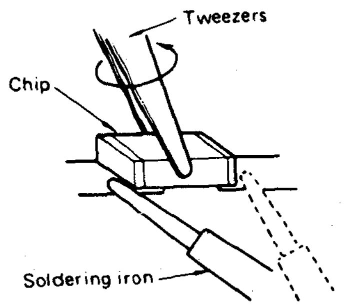
A1 → 10×10^1 = 100 pF
N2 → 33×10^2 = 3300 pF
S3 → 47×10^3 = 47000 pF

5. Precautions in replacing the chip component

1. Make sure that the unit is turned OFF when replacing the chip.
2. Use tweezers to prevent any damage to the chip surface.
3. Do not re-use the chips after removal.
4. Do not rub the electrode of chips.
5. Do not subject the chips to excessive stress.
6. It is recommended that a pencil-type soldering iron to be used.
7. The solder whose diameter is less than 0.5 mm is recommended.
8. Do not heat the chip beyond 3 seconds.
9. Maintain temperature control under 260°C (500°F) when soldering.

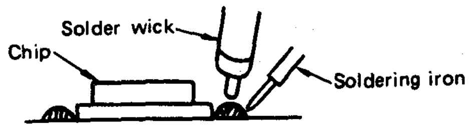
5-1 Removal (Transistor, Diode, Resistor and Capacitor)

1. Add the solder to both ends of the chip (three leads for chip transistor).
2. While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning it with tweezers.
   Note Be careful not to damage other chips.

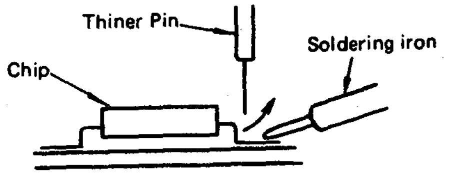

Tweezers
Chip
Soldering iron

5-2 Removal (IC)

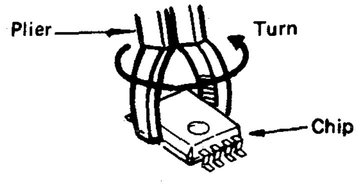
1. Add the solder wick and solder iron to each lead of the IC and remove solder.


Solder wick
Chip
Soldering iron

2. Add the solder iron to each lead of the IC and left each lead of the IC using thiner pin.

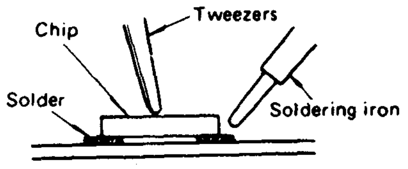

Thiner Pin
Chip
Soldering iron

3. Remove IC turning it with plier.

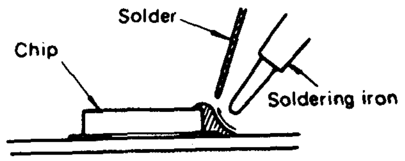

Plier
Turn
Chip

5-3 Mounting

1. Place the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.


Chip
Tweezers
Solder
Soldering iron

3. Solder both ends of chip (three leads for chip transistor).


Solder
Chip
Soldering iron

Service Manual

PAL Colour Video Camera
WV-F200 Series

Vol. 3

Block Diagrams
Schematic Diagrams
Conductor Views

CONTENTS

BLOCK DIAGRAM

PREAMPLIFIER BOARD 3-2
CCD DRIVE BOARD 3-3
PROCESS-1 BOARD 3-4
PROCESS-2 BOARD 3-5
ENCODER BOARD 3-6
AUTO BOARD 3-7
SYNC BOARD 3-8
DETAIL BOARD 3-9
SHADING BOARD 3-10
POWER BOARD 3-11
CAMERA ADAPTOR 3-12
1.5" VIEWFINDER WV-VF38 3-13

SCHEMATIC DIAGRAM

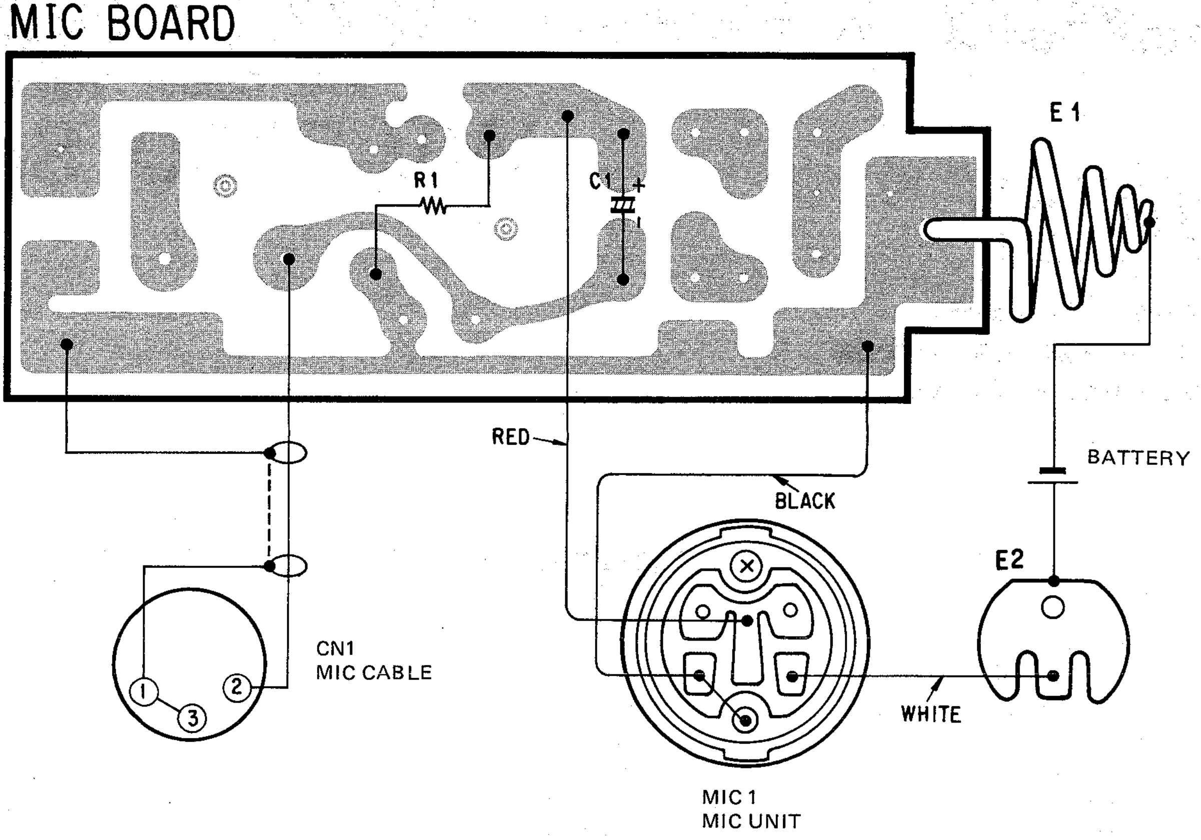
MICROPHONE WV-MC35 3-1
CCD AND PRISM ASSEMBLY 3-14
PREAMPLIFIER BOARD 3-15
CCD DRIVE BOARD 3-17
PROCESS-1 BOARD 3-20
PROCESS-2 BOARD 3-21
ENCODER BOARD 3-24
SYNC BOARD 3-25
AUTO BOARD 3-28
DETAIL BOARD 3-29
SHADING BOARD 3-32
POWER BOARD 3-33
MOTHER BOARD 3-36
CAMERA ADAPTOR 3-37
1.5" VIEWFINDER WV-VF38 3-39
12X SERVO CONTROL ZOOM LENS J12X10BKRSM 3-41

CONDUCTOR VIEW

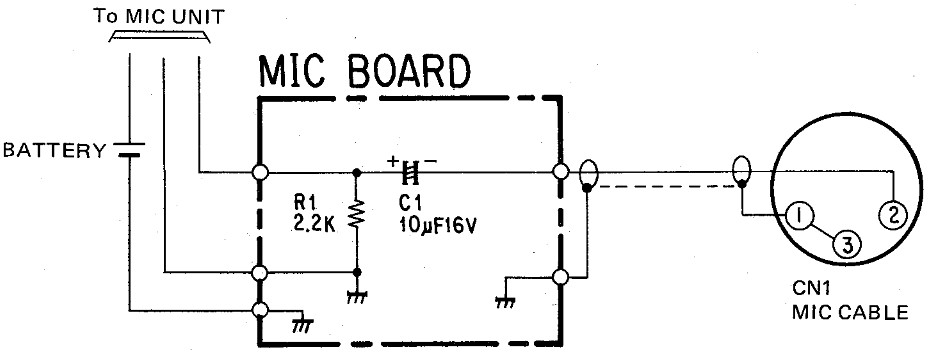
MICROPHONE WV-MC35 3-1
PREAMPLIFIER BOARD 3-16
CCD DRIVE BOARD 3-18
PROCESS-1 BOARD 3-19
PROCESS-2 BOARD 3-22
ENCODER BOARD 3-23
SYNC BOARD 3-26
AUTO BOARD 3-27
DETAIL BOARD 3-30
SHADING BOARD 3-31
POWER BOARD 3-34
MOTHER BOARD 3-35
CAMERA ADAPTOR 3-38
1.5" VIEWFINDER WV-VF38 3-40
12X SERVO CONTROL ZOOM LENS J12X10BKRSM 3-42

WIRING DIAGRAM 3-43

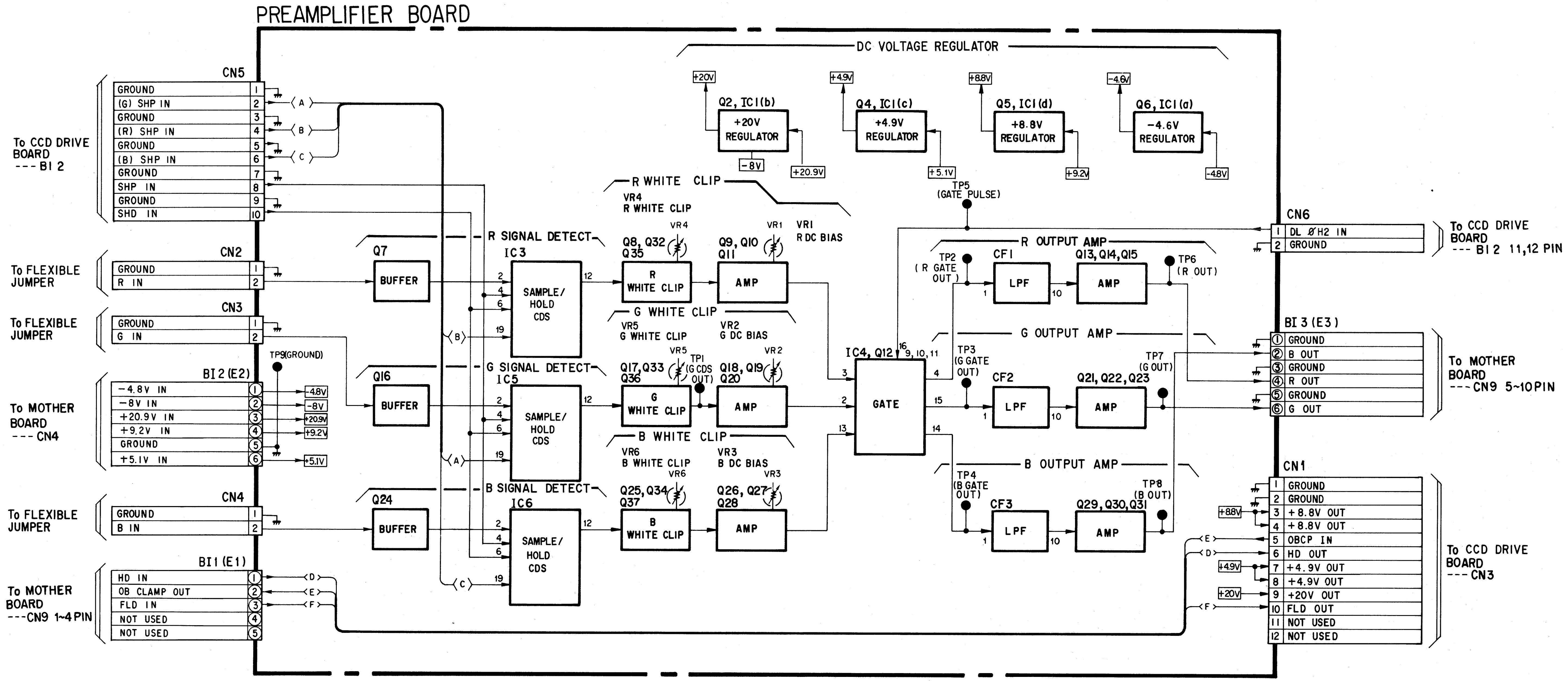
CONDUCTOR VIEW OF MICROPHONE WV-MC35


MIC BOARD
R1
C1
E1
RED
BLACK
BATTERY
E2
WHITE
CN1
MIC CABLE
MIC 1
MIC UNIT
1
2
3

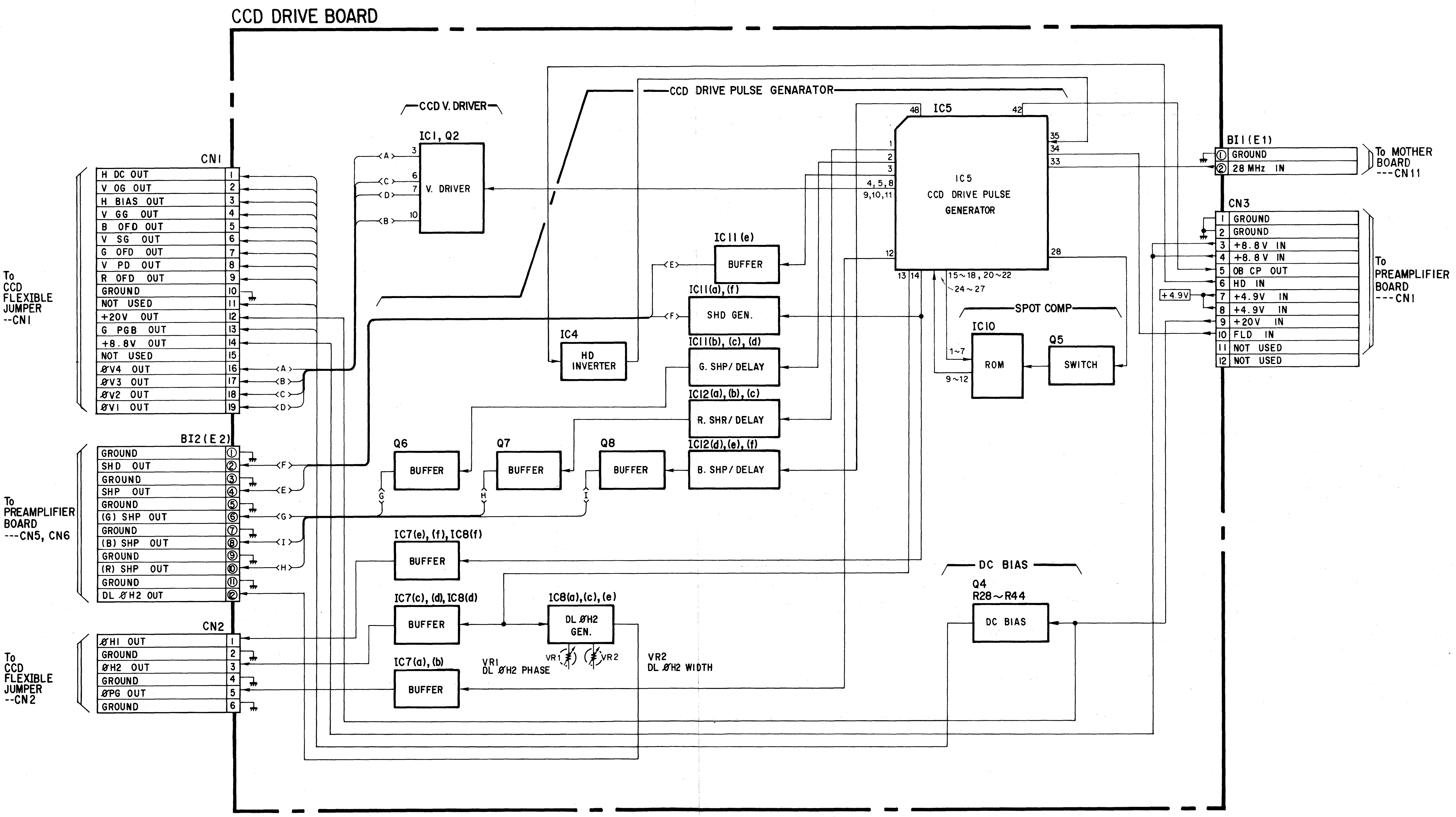
SCHEMATIC DIAGRAM OF MICROPHONE WV-MC35


To MIC UNIT
BATTERY
MIC BOARD
R1
2.2K
C1
10μF16V
+
−
CN1
MIC CABLE
1
2
3

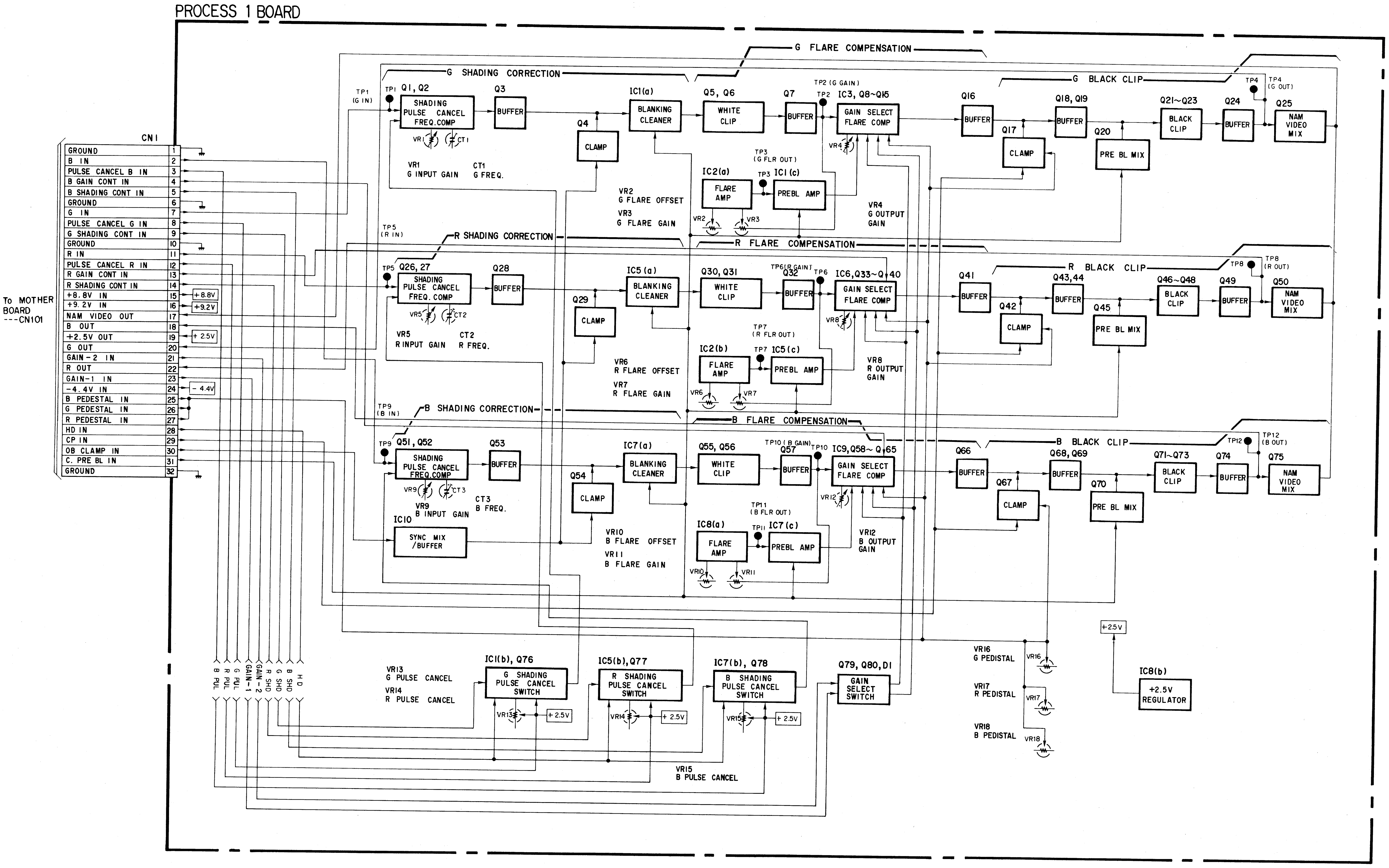
BLOCK DIAGRAM OF PREAMPLIFIER BOARD


PREAMPLIFIER BOARD
CN5
GROUND 1
(G) SHP IN 2
GROUND 3
(R) SHP IN 4
GROUND 5
(B) SHP IN 6
GROUND 7
SHP IN 8
GROUND 9
SHD IN 10
To CCD DRIVE BOARD ---BI 2
CN2
GROUND 1
R IN 2
To FLEXIBLE JUMPER
CN3
GROUND 1
G IN 2
To FLEXIBLE JUMPER
TP9(GROUND)
BI 2 (E2)
-4.8V IN ①
-8V IN ②
+20.9V IN ③
+9.2V IN ④
GROUND ⑤
+5.1V IN ⑥
-4.8V
-8V
+20.9V
+9.2V
+5.1V
To MOTHER BOARD ---CN4
CN4
GROUND 1
B IN 2
To FLEXIBLE JUMPER
BI1 (E1)
HD IN ①
OB CLAMP OUT ②
FLD IN ③
NOT USED ④
NOT USED ⑤
To MOTHER BOARD ---CN9 1~4PIN
A
B
C
D
E
F
Q7
BUFFER
Q16
BUFFER
Q24
BUFFER
R SIGNAL DETECT
IC3
SAMPLE/ HOLD CDS
G SIGNAL DETECT
IC5
SAMPLE/ HOLD CDS
B SIGNAL DETECT
IC6
SAMPLE/ HOLD CDS
2
4
6
19
12
R WHITE CLIP
VR4
R WHITE CLIP
Q8, Q32 Q35
VR4
R WHITE CLIP
Q9, Q10 Q11
VR1
VR1
R DC BIAS
AMP
G WHITE CLIP
VR5
G WHITE CLIP
VR2
G DC BIAS
Q17, Q33 Q36
VR5
TP1 (G CDS OUT)
G WHITE CLIP
Q18, Q19 Q20
VR2
AMP
B WHITE CLIP
VR6
B WHITE CLIP
VR3
B DC BIAS
Q25, Q34 Q37
VR6
B WHITE CLIP
Q26, Q27 Q28
VR3
AMP
DC VOLTAGE REGULATOR
+20V
Q2, IC1(b)
+20V REGULATOR
-8V
+20.9V
+4.9V
Q4, IC1(c)
+4.9V REGULATOR
+5.1V
+8.8V
Q5, IC1(d)
+8.8V REGULATOR
+9.2V
-4.6V
Q6, IC1(a)
-4.6V REGULATOR
-4.8V
TP5 (GATE PULSE)
IC4, Q12
16
9, 10, 11
3
2
13
4
15
14
GATE
R OUTPUT AMP
TP2 (R GATE OUT)
CF1
LPF
1
10
Q13, Q14, Q15
AMP
TP6 (R OUT)
G OUTPUT AMP
TP3 (G GATE OUT)
CF2
LPF
Q21, Q22, Q23
AMP
TP7 (G OUT)
B OUTPUT AMP
TP4 (B GATE OUT)
CF3
LPF
Q29, Q30, Q31
AMP
TP8 (B OUT)
CN6
DL ØH2 IN 1
GROUND 2
To CCD DRIVE BOARD --- BI 2 11,12 PIN
BI 3 (E3)
① GROUND
② B OUT
③ GROUND
④ R OUT
⑤ GROUND
⑥ G OUT
To MOTHER BOARD ---CN9 5~10PIN
CN1
1 GROUND
2 GROUND
3 +8.8V OUT
4 +8.8V OUT
5 OBCP IN
6 HD OUT
7 +4.9V OUT
8 +4.9V OUT
9 +20V OUT
10 FLD OUT
11 NOT USED
12 NOT USED
+8.8V
+4.9V
+20V
To CCD DRIVE BOARD ---CN3

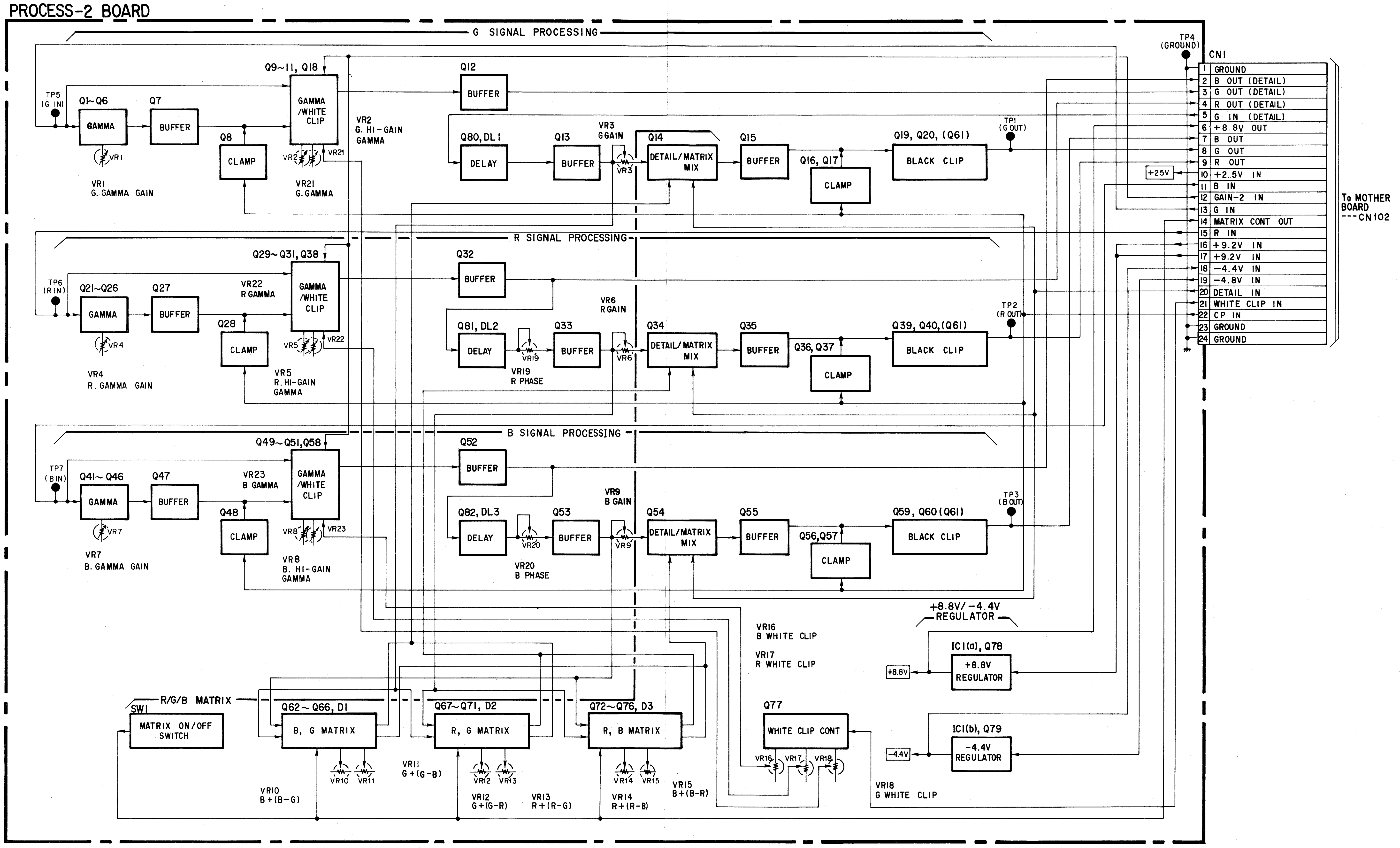
BLOCK DIAGRAM OF CCD DRIVE BOARD


CCD DRIVE BOARD
CN1
1 H DC OUT
2 V OG OUT
3 H BIAS OUT
4 V GG OUT
5 B OFD OUT
6 V SG OUT
7 G OFD OUT
8 V PD OUT
9 R OFD OUT
10 GROUND
11 NOT USED
12 +20V OUT
13 G PGB OUT
14 +8.8V OUT
15 NOT USED
16 ØV4 OUT
17 ØV3 OUT
18 ØV2 OUT
19 ØV1 OUT
To CCD FLEXIBLE JUMPER --CN1
BI2 (E2)
① GROUND
② SHD OUT
③ GROUND
④ SHP OUT
⑤ GROUND
⑥ (G) SHP OUT
⑦ GROUND
⑧ (B) SHP OUT
⑨ GROUND
⑩ (R) SHP OUT
⑪ GROUND
⑫ DL ØH2 OUT
To PREAMPLIFIER BOARD ---CN5, CN6
CN2
1 ØH1 OUT
2 GROUND
3 ØH2 OUT
4 GROUND
5 ØPG OUT
6 GROUND
To CCD FLEXIBLE JUMPER --CN2
CCD V. DRIVER
IC1, Q2
V. DRIVER
A
B
C
D
E
F
G
H
I
3
6
7
10
CCD DRIVE PULSE GENARATOR
IC5
48
42
1
2
3
4, 5, 8
9, 10, 11
12
13
14
35
34
33
28
15~18, 20~22
24~27
IC5
CCD DRIVE PULSE GENERATOR
IC11 (e)
BUFFER
IC11 (a), (f)
SHD GEN.
IC4
HD INVERTER
IC11 (b), (c), (d)
G. SHP/ DELAY
IC12 (a), (b), (c)
R. SHR/ DELAY
IC12 (d), (e), (f)
B. SHP/ DELAY
Q6
BUFFER
Q7
BUFFER
Q8
BUFFER
SPOT COMP
IC10
ROM
1~7
9~12
Q5
SWITCH
IC7 (e), (f), IC8 (f)
BUFFER
IC7 (c), (d), IC8 (d)
BUFFER
IC8 (a), (c), (e)
DL ØH2 GEN.
VR1
VR2
VR1 DL ØH2 PHASE
VR2 DL ØH2 WIDTH
IC7 (a), (b)
BUFFER
DC BIAS
Q4 R28~R44
DC BIAS
BI1 (E1)
① GROUND
② 28 MHz IN
To MOTHER BOARD ---CN11
CN3
1 GROUND
2 GROUND
3 +8.8V IN
4 +8.8V IN
5 OB CP OUT
6 HD IN
7 +4.9V IN
8 +4.9V IN
9 +20V IN
10 FLD IN
11 NOT USED
12 NOT USED
+4.9V
To PREAMPLIFIER BOARD ---CN1

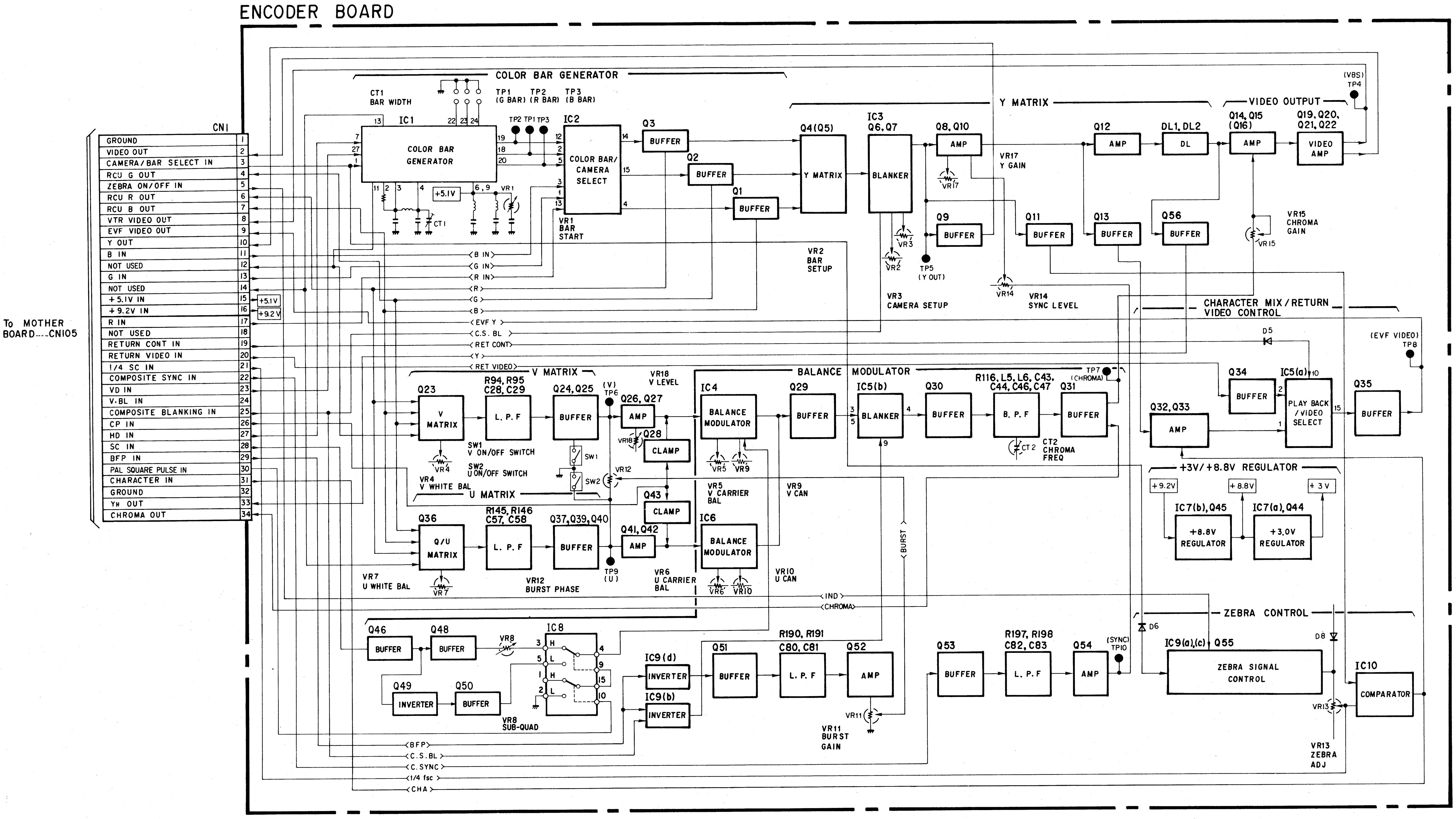
BLOCK DIAGRAM OF PROCESS-1 BOARD


PROCESS 1 BOARD
CN1
1 GROUND
2 B IN
3 PULSE CANCEL B IN
4 B GAIN CONT IN
5 B SHADING CONT IN
6 GROUND
7 G IN
8 PULSE CANCEL G IN
9 G SHADING CONT IN
10 GROUND
11 R IN
12 PULSE CANCEL R IN
13 R GAIN CONT IN
14 R SHADING CONT IN
15 +8.8V IN
16 +9.2V IN
17 NAM VIDEO OUT
18 B OUT
19 +2.5V OUT
20 G OUT
21 GAIN-2 IN
22 R OUT
23 GAIN-1 IN
24 -4.4V IN
25 B PEDESTAL IN
26 G PEDESTAL IN
27 R PEDESTAL IN
28 HD IN
29 CP IN
30 OB CLAMP IN
31 C. PRE BL IN
32 GROUND
+8.8V
+9.2V
+2.5V
-4.4V
To MOTHER BOARD ---CN101
G FLARE COMPENSATION
G SHADING CORRECTION
TP1 (G IN)
TP1
Q1, Q2
SHADING PULSE CANCEL FREQ.COMP
VR1
CT1
VR1 G INPUT GAIN
CT1 G FREQ.
Q3
BUFFER
Q4
CLAMP
IC1(a)
BLANKING CLEANER
Q5, Q6
WHITE CLIP
Q7
BUFFER
TP2 (G GAIN)
TP2
IC3, Q8~Q15
GAIN SELECT FLARE COMP
VR4
TP3 (G FLR OUT)
IC2(a)
FLARE AMP
TP3
IC1(c)
PREBL AMP
VR2
VR3
VR2 G FLARE OFFSET
VR3 G FLARE GAIN
VR4 G OUTPUT GAIN
Q16
BUFFER
G BLACK CLIP
Q17
CLAMP
Q18, Q19
BUFFER
Q20
PRE BL MIX
Q21~Q23
BLACK CLIP
Q24
BUFFER
TP4
TP4 (G OUT)
Q25
NAM VIDEO MIX
TP5 (R IN)
R SHADING CORRECTION
R FLARE COMPENSATION
TP5
Q26, 27
SHADING PULSE CANCEL FREQ. COMP
VR5
CT2
VR5 R INPUT GAIN
CT2 R FREQ.
Q28
BUFFER
Q29
CLAMP
IC5(a)
BLANKING CLEANER
Q30, Q31
WHITE CLIP
TP6(R GAIN)
Q32
TP6
BUFFER
IC6, Q33~Q40
GAIN SELECT FLARE COMP
VR8
TP7 (R FLR OUT)
IC2(b)
FLARE AMP
TP7
IC5(c)
PREBL AMP
VR6
VR7
VR6 R FLARE OFFSET
VR7 R FLARE GAIN
VR8 R OUTPUT GAIN
Q41
BUFFER
R BLACK CLIP
Q42
CLAMP
Q43, 44
BUFFER
Q45
PRE BL MIX
Q46~Q48
BLACK CLIP
Q49
BUFFER
TP8
TP8 (R OUT)
Q50
NAM VIDEO MIX
TP9 (B IN)
B SHADING CORRECTION
B FLARE COMPENSATION
TP9
Q51, Q52
SHADING PULSE CANCEL FREQ. COMP
VR9
CT3
VR9 B INPUT GAIN
CT3 B FREQ.
Q53
BUFFER
IC10
SYNC MIX /BUFFER
Q54
CLAMP
IC7(a)
BLANKING CLEANER
Q55, Q56
WHITE CLIP
TP10 (B GAIN)
Q57
TP10
BUFFER
IC9, Q58~Q65
GAIN SELECT FLARE COMP
VR12
TP11 (B FLR OUT)
IC8(a)
FLARE AMP
TP11
IC7(c)
PREBL AMP
VR10
VR11
VR10 B FLARE OFFSET
VR11 B FLARE GAIN
VR12 B OUTPUT GAIN
Q66
BUFFER
B BLACK CLIP
Q67
CLAMP
Q68, Q69
BUFFER
Q70
PRE BL MIX
Q71~Q73
BLACK CLIP
Q74
BUFFER
TP12
TP12 (B OUT)
Q75
NAM VIDEO MIX
B PUL
G PUL
R PUL
GAIN-1
GAIN-2
R SHD
G SHD
B SHD
HD
VR13 G PULSE CANCEL
VR14 R PULSE CANCEL
IC1(b), Q76
G SHADING PULSE CANCEL SWITCH
VR13
+2.5V
IC5(b), Q77
R SHADING PULSE CANCEL SWITCH
VR14
+2.5V
IC7(b), Q78
B SHADING PULSE CANCEL SWITCH
VR15
+2.5V
VR15 B PULSE CANCEL
Q79, Q80, D1
GAIN SELECT SWITCH
VR16 G PEDESTAL
VR16
VR17 R PEDESTAL
VR17
VR18 B PEDESTAL
VR18
+2.5V
IC8(b)
+2.5V REGULATOR

BLOCK DIAGRAM OF PROCESS-2 BOARD

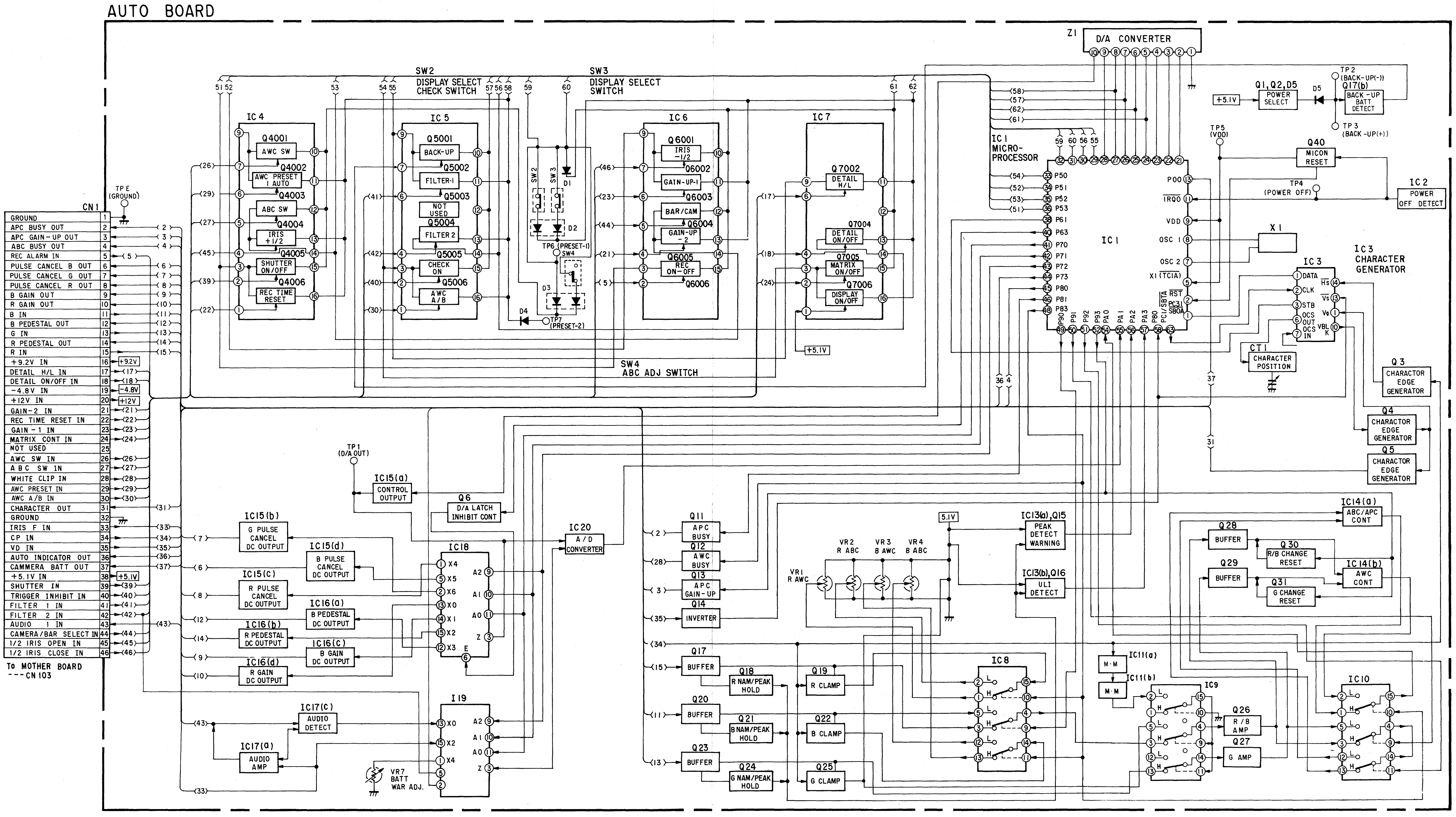

PROCESS-2 BOARD
G SIGNAL PROCESSING
R SIGNAL PROCESSING
B SIGNAL PROCESSING
TP5 (G IN)
TP6 (R IN)
TP7 (B IN)
Q1~Q6
GAMMA
Q7
BUFFER
Q8
CLAMP
Q9~11, Q18
GAMMA /WHITE CLIP
VR1
VR1 G. GAMMA GAIN
VR2
VR2 G. HI-GAIN GAMMA
VR21
VR21 G. GAMMA
Q12
BUFFER
Q80, DL1
DELAY
Q13
BUFFER
VR3 G GAIN
VR3
Q14
DETAIL/MATRIX MIX
Q15
BUFFER
Q16, Q17
CLAMP
Q19, Q20, (Q61)
BLACK CLIP
TP1 (G OUT)
Q21~Q26
GAMMA
Q27
BUFFER
Q28
CLAMP
Q29~Q31, Q38
GAMMA /WHITE CLIP
VR22 R GAMMA
VR4
VR4 R. GAMMA GAIN
VR5
VR5 R. HI-GAIN GAMMA
VR22
Q32
BUFFER
Q81, DL2
DELAY
VR19
VR19 R PHASE
Q33
BUFFER
VR6 R GAIN
VR6
Q34
DETAIL/MATRIX MIX
Q35
BUFFER
Q36, Q37
CLAMP
Q39, Q40, (Q61)
BLACK CLIP
TP2 (R OUT)
Q41~Q46
GAMMA
Q47
BUFFER
Q48
CLAMP
Q49~Q51, Q58
GAMMA /WHITE CLIP
VR23 B GAMMA
VR7
VR7 B. GAMMA GAIN
VR8
VR8 B. HI-GAIN GAMMA
VR23
Q52
BUFFER
Q82, DL3
DELAY
VR20
VR20 B PHASE
Q53
BUFFER
VR9 B GAIN
VR9
Q54
DETAIL/MATRIX MIX
Q55
BUFFER
Q56, Q57
CLAMP
Q59, Q60 (Q61)
BLACK CLIP
TP3 (B OUT)
TP4 (GROUND)
CN1
1 GROUND
2 B OUT (DETAIL)
3 G OUT (DETAIL)
4 R OUT (DETAIL)
5 G IN (DETAIL)
6 +8.8V OUT
7 B OUT
8 G OUT
9 R OUT
10 +2.5V IN
11 B IN
12 GAIN-2 IN
13 G IN
14 MATRIX CONT OUT
15 R IN
16 +9.2V IN
17 +9.2V IN
18 −4.4V IN
19 −4.8V IN
20 DETAIL IN
21 WHITE CLIP IN
22 CP IN
23 GROUND
24 GROUND
+2.5V
To MOTHER BOARD ---CN102
+8.8V/−4.4V REGULATOR
IC1(a), Q78
+8.8V REGULATOR
+8.8V
IC1(b), Q79
−4.4V REGULATOR
−4.4V
VR16 B WHITE CLIP
VR17 R WHITE CLIP
Q77
WHITE CLIP CONT
VR16
VR17
VR18
VR18 G WHITE CLIP
R/G/B MATRIX
SW1
MATRIX ON/OFF SWITCH
Q62~Q66, D1
B, G MATRIX
VR10
VR11
VR10 B+(B−G)
VR11 G+(G−B)
Q67~Q71, D2
R, G MATRIX
VR12
VR13
VR12 G+(G−R)
VR13 R+(R−G)
Q72~Q76, D3
R, B MATRIX
VR14
VR15
VR14 R+(R−B)
VR15 B+(B−R)

BLOCK DIAGRAM OF ENCODER BOARD

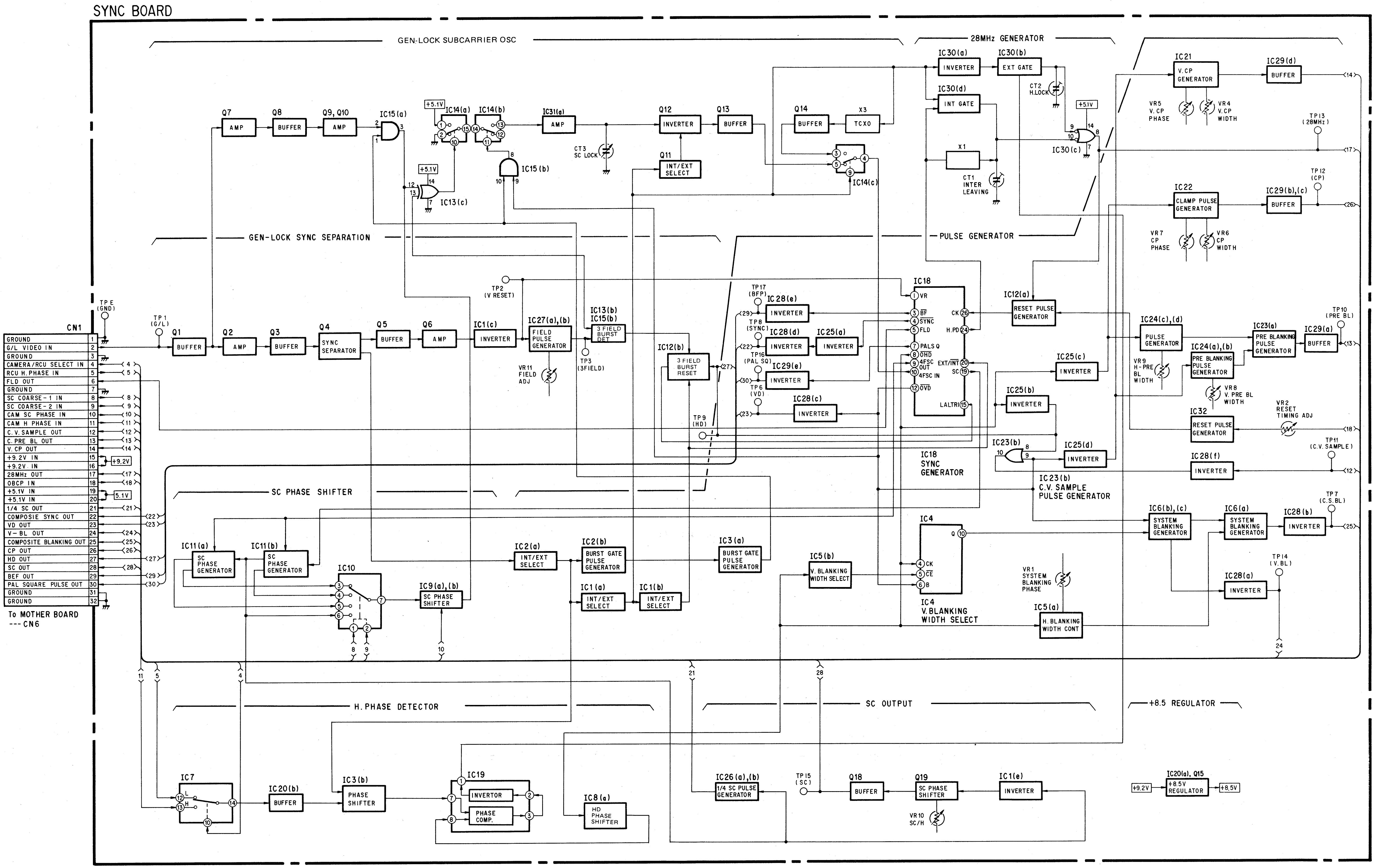


ENCODER BOARD
To MOTHER BOARD----CN105
CN1
1 GROUND
2 VIDEO OUT
3 CAMERA/BAR SELECT IN
4 RCU G OUT
5 ZEBRA ON/OFF IN
6 RCU R OUT
7 RCU B OUT
8 VTR VIDEO OUT
9 EVF VIDEO OUT
10 Y OUT
11 B IN
12 NOT USED
13 G IN
14 NOT USED
15 +5.1V IN
16 +9.2V IN
17 R IN
18 NOT USED
19 RETURN CONT IN
20 RETURN VIDEO IN
21 1/4 SC IN
22 COMPOSITE SYNC IN
23 VD IN
24 V-BL IN
25 COMPOSITE BLANKING IN
26 CP IN
27 HD IN
28 SC IN
29 BFP IN
30 PAL SQUARE PULSE IN
31 CHARACTER IN
32 GROUND
33 YH OUT
34 CHROMA OUT
+5.1V
+9.2V
COLOR BAR GENERATOR
CT1 BAR WIDTH
TP1 (G BAR)
TP2 (R BAR)
TP3 (B BAR)
IC1
COLOR BAR GENERATOR
+5.1V
VR1
CT1
TP2 TP1 TP3
IC2
COLOR BAR/CAMERA SELECT
VR1 BAR START
Q3 BUFFER
Q2 BUFFER
Q1 BUFFER
B IN
G IN
R IN
R
G
B
EVF Y
C.S. BL
RET CONT
Y
RET VIDEO
Y MATRIX
Q4(Q5) Y MATRIX
IC3 Q6,Q7 BLANKER
Q8,Q10 AMP
VR17
VR17 Y GAIN
VR3
VR2
VR2 BAR SETUP
VR3 CAMERA SETUP
TP5 (Y OUT)
Q9 BUFFER
VR14
VR14 SYNC LEVEL
Q11 BUFFER
Q12 AMP
DL1, DL2 DL
Q13 BUFFER
Q56 BUFFER
VIDEO OUTPUT
Q14, Q15 (Q16) AMP
Q19, Q20, Q21, Q22 VIDEO AMP
(VBS) TP4
VR15 CHROMA GAIN
VR15
CHARACTER MIX/RETURN VIDEO CONTROL
D5
(EVF VIDEO) TP8
V MATRIX
Q23 V MATRIX
R94, R95 C28, C29 L.P.F
Q24, Q25 BUFFER
(V) TP6
Q26, Q27 AMP
VR18 V LEVEL
VR18
Q28 CLAMP
SW1 V ON/OFF SWITCH
SW2 U ON/OFF SWITCH
SW1
SW2
VR12
VR4
VR4 V WHITE BAL
U MATRIX
Q43 CLAMP
Q36 Q/U MATRIX
R145, R146 C57, C58 L.P.F
Q37, Q39, Q40 BUFFER
Q41, Q42 AMP
TP9 (U)
VR7 U WHITE BAL
VR7
VR12 BURST PHASE
BALANCE MODULATOR
IC4 BALANCE MODULATOR
VR5 VR9
VR5 V CARRIER BAL
VR9 V CAN
IC6 BALANCE MODULATOR
VR6 VR10
VR6 U CARRIER BAL
VR10 U CAN
Q29 BUFFER
IC5(b) BLANKER
Q30 BUFFER
R116, L5, L6, C43, C44, C46, C47 B.P.F
CT2
CT2 CHROMA FREQ
TP7 (CHROMA)
Q31 BUFFER
BURST
IND
CHROMA
Q34 BUFFER
IC5(a) PLAY BACK/VIDEO SELECT
Q35 BUFFER
Q32, Q33 AMP
+3V/+8.8V REGULATOR
+9.2V
+8.8V
+3V
IC7(b), Q45 +8.8V REGULATOR
IC7(a), Q44 +3.0V REGULATOR
Q46 BUFFER
Q48 BUFFER
VR8
IC8
H L H L
Q49 INVERTER
Q50 BUFFER
VR8 SUB-QUAD
IC9(d) INVERTER
IC9(b) INVERTER
Q51 BUFFER
R190, R191 C80, C81 L.P.F
Q52 AMP
VR11
VR11 BURST GAIN
Q53 BUFFER
R197, R198 C82, C83 L.P.F
Q54 AMP
(SYNC) TP10
ZEBRA CONTROL
D6
D8
IC9(a),(c) Q55 ZEBRA SIGNAL CONTROL
IC10 COMPARATOR
VR13
VR13 ZEBRA ADJ
BFP
C.S.BL
C.SYNC
1/4 fsc
CHA

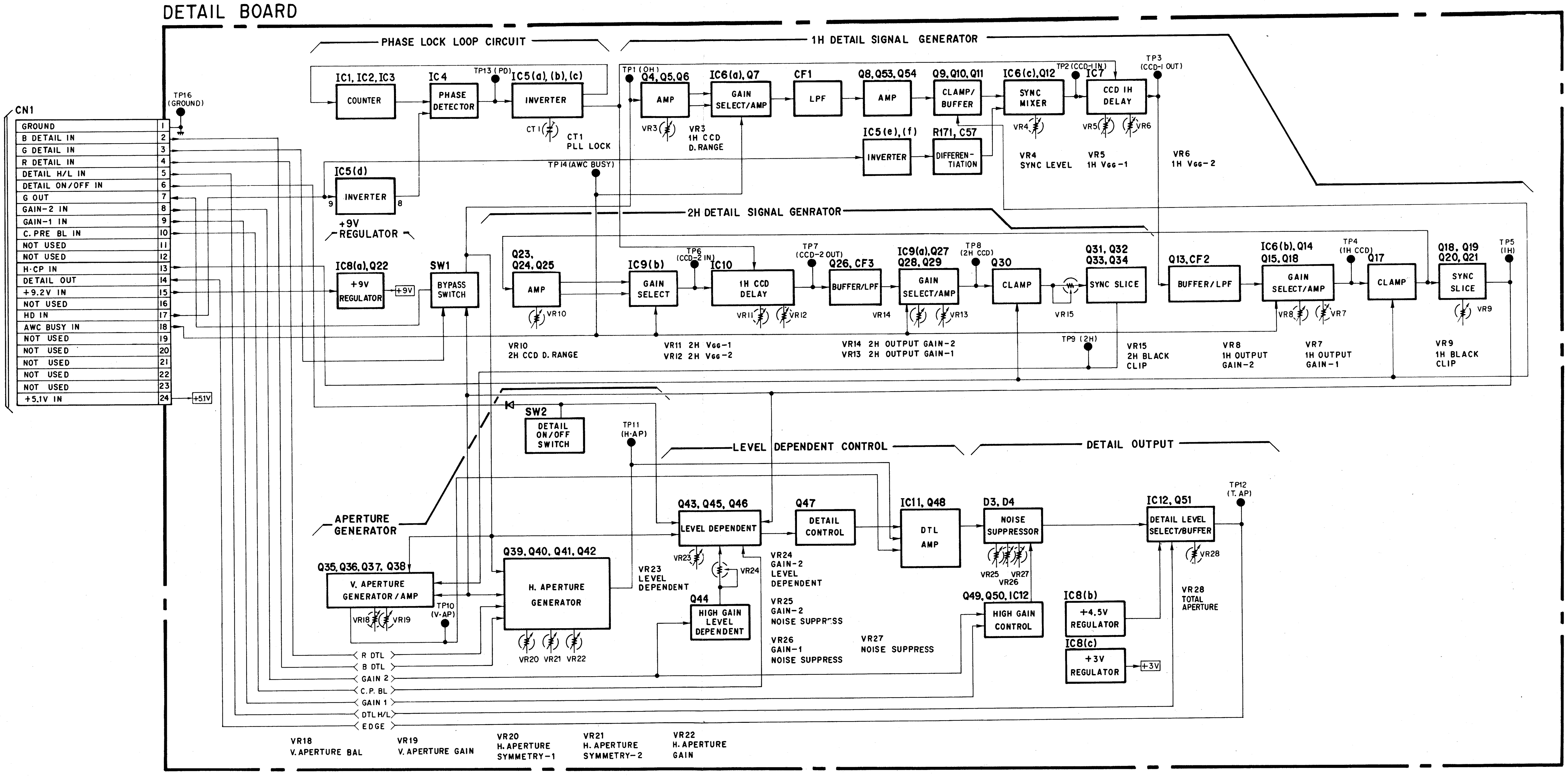
BLOCK DIAGRAM OF AUTO BOARD


AUTO BOARD
CN1
GROUND 1
APC BUSY OUT 2
APC GAIN-UP OUT 3
ABC BUSY OUT 4
REC ALARM IN 5
PULSE CANCEL B OUT 6
PULSE CANCEL G OUT 7
PULSE CANCEL R OUT 8
B GAIN OUT 9
R GAIN OUT 10
B IN 11
B PEDESTAL OUT 12
G IN 13
R PEDESTAL OUT 14
R IN 15
+9.2V IN 16
DETAIL H/L IN 17
DETAIL ON/OFF IN 18
-4.8V IN 19
+12V IN 20
GAIN-2 IN 21
REC TIME RESET IN 22
GAIN-1 IN 23
MATRIX CONT IN 24
NOT USED 25
AWC SW IN 26
ABC SW IN 27
WHITE CLIP IN 28
AWC PRESET IN 29
AWC A/B IN 30
CHARACTER OUT 31
GROUND 32
IRIS F IN 33
CP IN 34
VD IN 35
AUTO INDICATOR OUT 36
CAMMERA BATT OUT 37
+5.1V IN 38
SHUTTER IN 39
TRIGGER INHIBIT IN 40
FILTER 1 IN 41
FILTER 2 IN 42
AUDIO 1 IN 43
CAMERA/BAR SELECT IN 44
1/2 IRIS OPEN IN 45
1/2 IRIS CLOSE IN 46
To MOTHER BOARD ---CN103
TP E (GROUND)
+9.2V
-4.8V
+12V
+5.1V
SW2 DISPLAY SELECT CHECK SWITCH
SW3 DISPLAY SELECT SWITCH
SW4 ABC ADJ SWITCH
IC4
Q4001 AWC SW
Q4002 AWC PRESET I AUTO
Q4003 ABC SW
Q4004 IRIS +1/2
Q4005 SHUTTER ON/OFF
Q4006 REC TIME RESET
IC5
Q5001 BACK-UP
Q5002 FILTER-1
Q5003 NOT USED
Q5004 FILTER 2
Q5005 CHECK ON
Q5006 AWC A/B
IC6
Q6001 IRIS -1/2
Q6002 GAIN-UP-1
Q6003 BAR/CAM
Q6004 GAIN-UP -2
Q6005 REC ON-OFF
Q6006
IC7
Q7002 DETAIL H/L
Q7004 DETAIL ON/OFF
Q7005 MATRIX ON/OFF
Q7006 DISPLAY ON/OFF
+5.1V
D1
D2
D3
D4
TP6 (PRESET-1) SW4
TP7 (PRESET-2)
Z1 D/A CONVERTER
IC1 MICRO-PROCESSOR
IC1
P50 P51 P52 P53 P61 P63 P70 P71 P72 P73 P80 P81 P83
P90 P91 P92 P93 PA0 PA1 PA2 PA3 PB0 PC1/SBTA
P00 IRQ0 VDD OSC 1 OSC 2 X1 (TCIA) RST PC31 SBOA
X1
TP5 (VDD)
Q1,Q2,D5 POWER SELECT
+5.1V
D5
TP2 (BACK-UP(-))
Q17(b) BACK-UP BATT DETECT
TP3 (BACK-UP(+))
Q40 MICON RESET
TP4 (POWER OFF)
IC2 POWER OFF DETECT
IC3 CHARACTER GENERATOR
IC3
DATA CLK STB OCS OUT OCS IN Hs Vs VBL K
CT1 CHARACTER POSITION
Q3 CHARACTOR EDGE GENERATOR
Q4 CHARACTOR EDGE GENERATOR
Q5 CHARACTOR EDGE GENERATOR
TP1 (D/A OUT)
IC15(a) CONTROL OUTPUT
Q6 D/A LATCH INHIBIT CONT
IC20 A/D CONVERTER
IC15(b) G PULSE CANCEL DC OUTPUT
IC15(d) B PULSE CANCEL DC OUTPUT
IC15(C) R PULSE CANCEL DC OUTPUT
IC16(a) B PEDESTAL DC OUTPUT
IC16(b) R PEDESTAL DC OUTPUT
IC16(C) B GAIN DC OUTPUT
IC16(d) R GAIN DC OUTPUT
IC18
X4 X5 X6 X0 X1 X2 X3 A2 A1 A0 Z E
IC17(C) AUDIO DETECT
IC17(a) AUDIO AMP
I19
VR7 BATT WAR ADJ.
Q11 APC BUSY
Q12 AWC BUSY
Q13 APC GAIN-UP
Q14 INVERTER
5.1V
VR1 R AWC
VR2 R ABC
VR3 B AWC
VR4 B ABC
IC13(a),Q15 PEAK DETECT WARNING
IC13(b),Q16 ULI DETECT
Q17 BUFFER
Q18 R NAM/PEAK HOLD
Q19 R CLAMP
Q20 BUFFER
Q21 B NAM/PEAK HOLD
Q22 B CLAMP
Q23 BUFFER
Q24 G NAM/PEAK HOLD
Q25 G CLAMP
IC8
IC11(a) M·M
IC11(b) M·M
IC9
Q26 R/B AMP
Q27 G AMP
IC10
Q28 BUFFER
Q29 BUFFER
Q30 R/B CHANGE RESET
Q31 G CHANGE RESET
IC14(a) ABC/APC CONT
IC14(b) AWC CONT

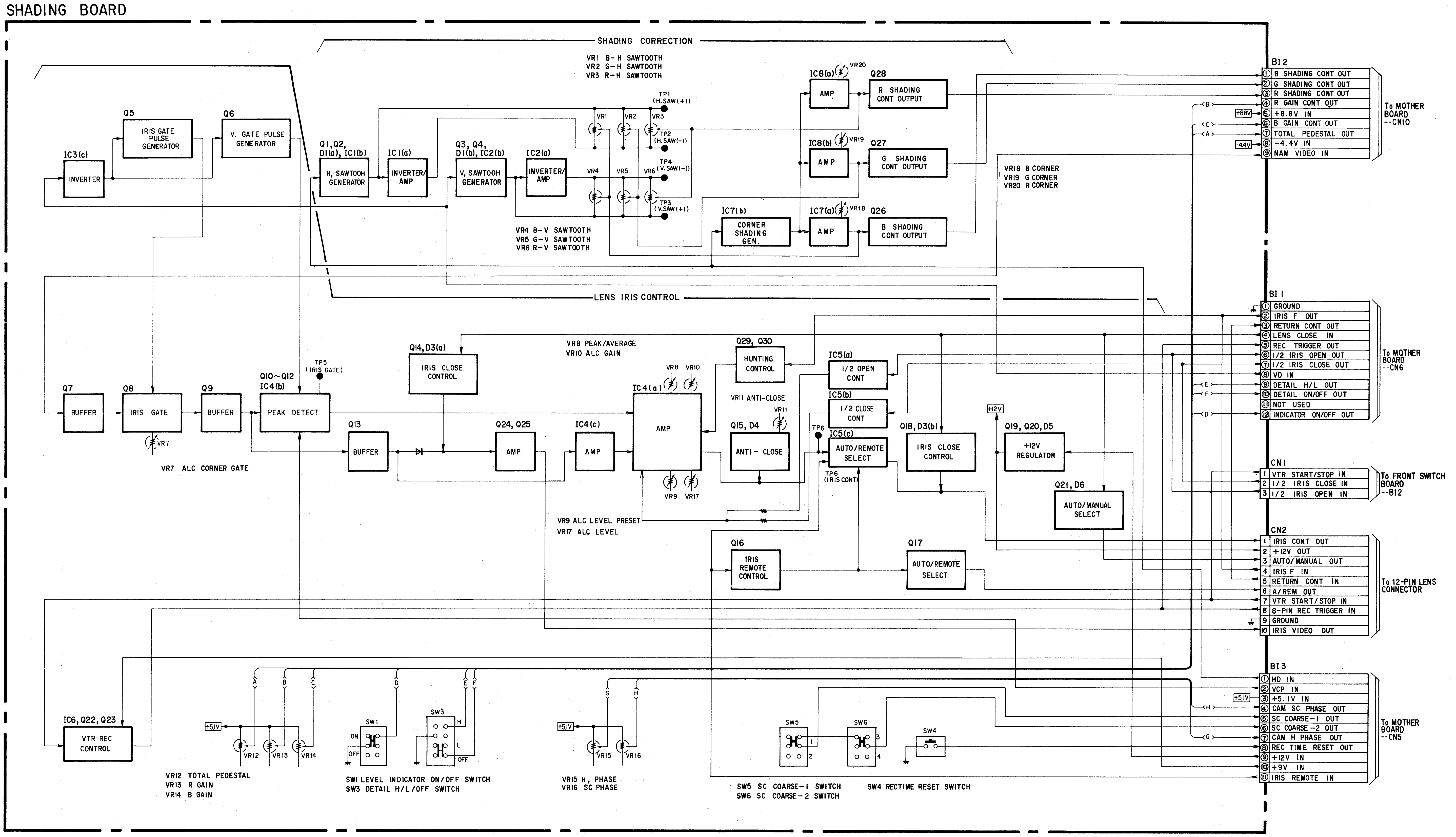
BLOCK DIAGRAM OF SYNC BOARD


SYNC BOARD
GEN-LOCK SUBCARRIER OSC
28MHz GENERATOR
GEN-LOCK SYNC SEPARATION
PULSE GENERATOR
SC PHASE SHIFTER
H. PHASE DETECTOR
SC OUTPUT
+8.5 REGULATOR
CN1
GROUND 1
G/L VIDEO IN 2
GROUND 3
CAMERA/RCU SELECT IN 4
RCU H. PHASE IN 5
FLD OUT 6
GROUND 7
SC COARSE-1 IN 8
SC COARSE-2 IN 9
CAM SC PHASE IN 10
CAM H PHASE IN 11
C.V. SAMPLE OUT 12
C. PRE BL OUT 13
V. CP OUT 14
+9.2V IN 15
+9.2V IN 16
28MHz OUT 17
OBCP IN 18
+5.1V IN 19
+5.1V IN 20
1/4 SC OUT 21
COMPOSIE SYNC OUT 22
VD OUT 23
V-BL OUT 24
COMPOSITE BLANKING OUT 25
CP OUT 26
HD OUT 27
SC OUT 28
BEF OUT 29
PAL SQUARE PULSE OUT 30
GROUND 31
GROUND 32
To MOTHER BOARD
--- CN6
+9.2V
5.1V
TP E (GND)
TP 1 (G/L)
Q1 BUFFER
Q2 AMP
Q3 BUFFER
Q4 SYNC SEPARATOR
Q5 BUFFER
Q6 AMP
IC1(c) INVERTER
TP2 (V RESET)
IC27(a),(b) FIELD PULSE GENERATOR
VR11 FIELD ADJ
IC13(b) IC15(b) 3 FIELD BURST DET
TP3 (3FIELD)
Q7 AMP
Q8 BUFFER
Q9, Q10 AMP
IC15(a)
IC14(a)
IC14(b)
+5.1V
IC13(c)
IC15(b)
IC31(a) AMP
CT3 SC LOCK
Q12 INVERTER
Q11 INT/EXT SELECT
Q13 BUFFER
Q14 BUFFER
X3 TCXO
IC14(c)
IC30(a) INVERTER
IC30(b) EXT GATE
IC30(d) INT GATE
CT2 H.LOCK
X1
CT1 INTER LEAVING
IC30(c)
IC21 V.CP GENERATOR
VR5 V.CP PHASE
VR4 V.CP WIDTH
IC29(d) BUFFER
TP13 (28MHz)
IC22 CLAMP PULSE GENERATOR
VR7 CP PHASE
VR6 CP WIDTH
IC29(b),(c) BUFFER
TP12 (CP)
TP17 (BFP)
IC28(e) INVERTER
TP8 (SYNC)
IC28(d) INVERTER
IC25(a) INVERTER
TP16 (PAL SQ)
IC29(e) INVERTER
TP6 (VD)
IC28(c) INVERTER
IC12(b) 3 FIELD BURST RESET
TP9 (HD)
IC18
VR
BF
SYNC
FLD
PALS Q
OHD
4FSC OUT
4FSC IN
OVD
CK
H.PD
EXT/INT
SC
LALTRI
IC18 SYNC GENERATOR
IC12(a) RESET PULSE GENERATOR
IC25(c) INVERTER
IC25(b) INVERTER
IC23(b)
IC25(d) INVERTER
IC23(b) C.V. SAMPLE PULSE GENERATOR
IC24(c),(d) PULSE GENERATOR
VR9 H-PRE BL WIDTH
IC24(a),(b) PRE BLANKING PULSE GENERATOR
VR8 V. PRE BL WIDTH
IC23(a) PRE BLANKING PULSE GENERATOR
IC29(a) BUFFER
TP10 (PRE BL)
IC32 RESET PULSE GENERATOR
VR2 RESET TIMING ADJ
TP11 (C.V. SAMPLE)
IC28(f) INVERTER
TP7 (C.S.BL)
IC6(b),(c) SYSTEM BLANKING GENERATOR
IC6(a) SYSTEM BLANKING GENERATOR
IC28(b) INVERTER
IC4 Q CK CE B
IC4 V. BLANKING WIDTH SELECT
IC5(b) V. BLANKING WIDTH SELECT
VR1 SYSTEM BLANKING PHASE
IC5(a) H. BLANKING WIDTH CONT
TP14 (V. BL)
IC28(a) INVERTER
IC11(a) SC PHASE GENERATOR
IC11(b) SC PHASE GENERATOR
IC10
IC9(a),(b) SC PHASE SHIFTER
IC2(a) INT/EXT SELECT
IC2(b) BURST GATE PULSE GENERATOR
IC1(a) INT/EXT SELECT
IC1(b) INT/EXT SELECT
IC3(a) BURST GATE PULSE GENERATOR
IC7 H
IC20(b) BUFFER
IC3(b) PHASE SHIFTER
IC19 INVERTOR PHASE COMP.
IC8(a) HD PHASE SHIFTER
IC26(a),(b) 1/4 SC PULSE GENERATOR
TP15 (SC)
Q18 BUFFER
Q19 SC PHASE SHIFTER
VR10 SC/H
IC1(e) INVERTER
IC20(a), Q15 +8.5V REGULATOR
+9.2V
+8.5V

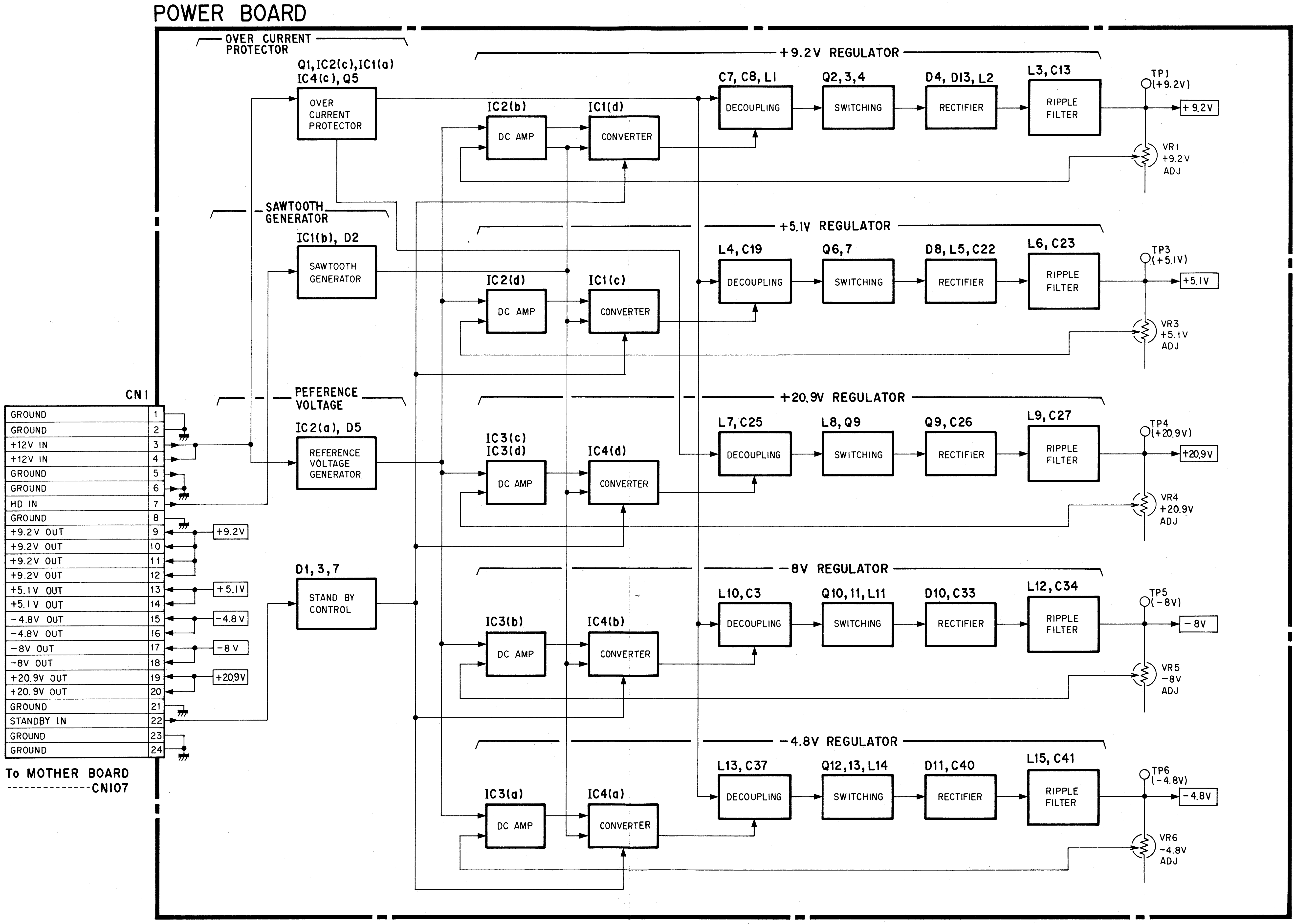
BLOCK DIAGRAM OF DETAIL BOARD


DETAIL BOARD
To MOTHER BOARD···CN104
CN1
GROUND 1
B DETAIL IN 2
G DETAIL IN 3
R DETAIL IN 4
DETAIL H/L IN 5
DETAIL ON/OFF IN 6
G OUT 7
GAIN-2 IN 8
GAIN-1 IN 9
C. PRE BL IN 10
NOT USED 11
NOT USED 12
H·CP IN 13
DETAIL OUT 14
+9.2V IN 15
NOT USED 16
HD IN 17
AWC BUSY IN 18
NOT USED 19
NOT USED 20
NOT USED 21
NOT USED 22
NOT USED 23
+5.1V IN 24
+51V
TP16 (GROUND)
PHASE LOCK LOOP CIRCUIT
IC1, IC2, IC3
COUNTER
IC4
PHASE DETECTOR
TP13 (PD)
IC5(a), (b), (c)
INVERTER
CT1
CT1 PLL LOCK
IC5(d)
INVERTER
9
8
+9V REGULATOR
TP14 (AWC BUSY)
1H DETAIL SIGNAL GENERATOR
TP1 (OH)
Q4, Q5, Q6
AMP
VR3
VR3 1H CCD D. RANGE
IC6(a), Q7
GAIN SELECT/AMP
CF1
LPF
Q8, Q53, Q54
AMP
Q9, Q10, Q11
CLAMP/BUFFER
IC5(e), (f)
INVERTER
R171, C57
DIFFEREN-TIATION
IC6(c), Q12
SYNC MIXER
VR4
TP2 (CCD-1 IN)
IC7
CCD 1H DELAY
VR5
VR6
TP3 (CCD-1 OUT)
VR4 SYNC LEVEL
VR5 1H V$_{GG}$-1
VR6 1H V$_{GG}$-2
2H DETAIL SIGNAL GENRATOR
Q23, Q24, Q25
AMP
VR10
IC8(a), Q22
+9V REGULATOR
+9V
SW1
BYPASS SWITCH
IC9(b)
GAIN SELECT
TP6 (CCD-2 IN)
IC10
1H CCD DELAY
VR11
VR12
TP7 (CCD-2 OUT)
Q26, CF3
BUFFER/LPF
IC9(a), Q27 Q28, Q29
GAIN SELECT/AMP
VR14
VR13
TP8 (2H CCD)
Q30
CLAMP
VR15
Q31, Q32 Q33, Q34
SYNC SLICE
TP9 (2H)
Q13, CF2
BUFFER/LPF
IC6(b), Q14 Q15, Q18
GAIN SELECT/AMP
VR8
VR7
TP4 (1H CCD)
Q17
CLAMP
Q18, Q19 Q20, Q21
SYNC SLICE
VR9
TP5 (1H)
VR10 2H CCD D. RANGE
VR11 2H V$_{GG}$-1
VR12 2H V$_{GG}$-2
VR14 2H OUTPUT GAIN-2
VR13 2H OUTPUT GAIN-1
VR15 2H BLACK CLIP
VR8 1H OUTPUT GAIN-2
VR7 1H OUTPUT GAIN-1
VR9 1H BLACK CLIP
SW2
DETAIL ON/OFF SWITCH
TP11 (H·AP)
LEVEL DEPENDENT CONTROL
DETAIL OUTPUT
APERTURE GENERATOR
Q35, Q36, Q37, Q38
V. APERTURE GENERATOR/AMP
VR18
VR19
TP10 (V·AP)
Q39, Q40, Q41, Q42
H. APERTURE GENERATOR
VR20 VR21 VR22
VR23 LEVEL DEPENDENT
Q43, Q45, Q46
LEVEL DEPENDENT
VR23
VR24
Q44
HIGH GAIN LEVEL DEPENDENT
Q47
DETAIL CONTROL
VR24 GAIN-2 LEVEL DEPENDENT
VR25 GAIN-2 NOISE SUPPRESS
VR26 GAIN-1 NOISE SUPPRESS
VR27 NOISE SUPPRESS
IC11, Q48
DTL AMP
D3, D4
NOISE SUPPRESSOR
VR25 VR27 VR26
Q49, Q50, IC12
HIGH GAIN CONTROL
IC8(b)
+4.5V REGULATOR
IC8(c)
+3V REGULATOR
+3V
IC12, Q51
DETAIL LEVEL SELECT/BUFFER
VR28
TP12 (T. AP)
VR28 TOTAL APERTURE
R DTL
B DTL
GAIN 2
C.P. BL
GAIN 1
DTL H/L
EDGE
VR18 V. APERTURE BAL
VR19 V. APERTURE GAIN
VR20 H. APERTURE SYMMETRY-1
VR21 H. APERTURE SYMMETRY-2
VR22 H. APERTURE GAIN

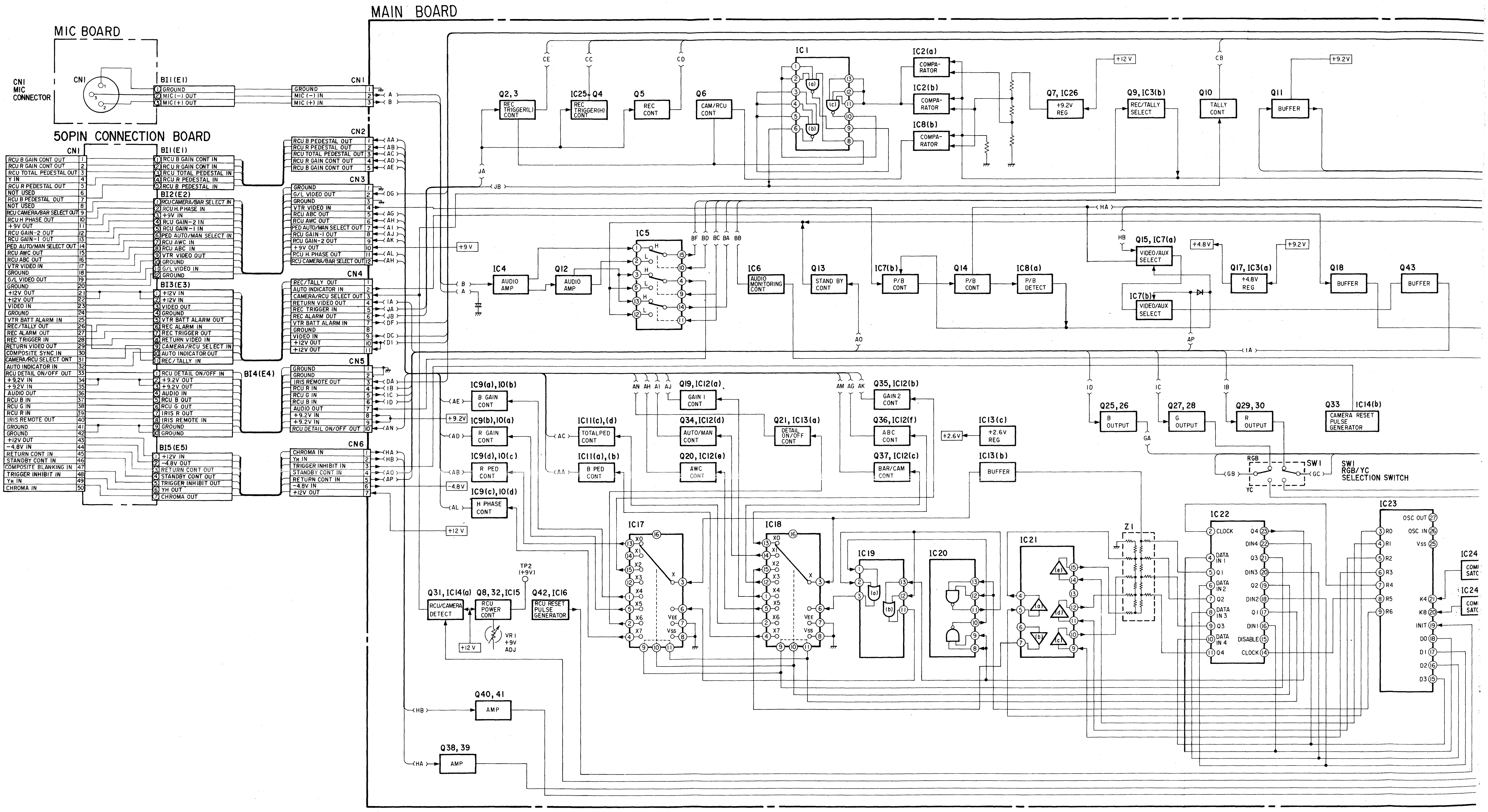
BLOCK DIAGRAM OF SHADING BOARD


SHADING BOARD
SHADING CORRECTION
LENS IRIS CONTROL
VR1 B-H SAWTOOTH
VR2 G-H SAWTOOTH
VR3 R-H SAWTOOTH
VR4 B-V SAWTOOTH
VR5 G-V SAWTOOTH
VR6 R-V SAWTOOTH
TP1 (H.SAW(+))
TP2 (H.SAW(-))
TP3 (V.SAW(+))
TP4 (V.SAW(-))
IC3(c) INVERTER
Q5 IRIS GATE PULSE GENERATOR
Q6 V. GATE PULSE GENERATOR
Q1, Q2, D1(a), IC1(b) H, SAWTOOH GENERATOR
IC1(a) INVERTER/AMP
Q3, Q4, D1(b), IC2(b) V, SAWTOOH GENERATOR
IC2(a) INVERTER/AMP
IC8(a) AMP VR20
Q28 R SHADING CONT OUTPUT
IC8(b) AMP VR19
Q27 G SHADING CONT OUTPUT
IC7(b) CORNER SHADING GEN.
IC7(a) AMP VR18
Q26 B SHADING CONT OUTPUT
VR18 B CORNER
VR19 G CORNER
VR20 R CORNER
BI2
① B SHADING CONT OUT
② G SHADING CONT OUT
③ R SHADING CONT OUT
④ R GAIN CONT OUT
⑤ +8.8V IN
⑥ B GAIN CONT OUT
⑦ TOTAL PEDESTAL OUT
⑧ -4.4V IN
⑨ NAM VIDEO IN
+88V
-44V
To MOTHER BOARD --CN10
Q7 BUFFER
Q8 IRIS GATE
VR7
VR7 ALC CORNER GATE
Q9 BUFFER
TP5 (IRIS GATE)
Q10~Q12 IC4(b) PEAK DETECT
Q14, D3(a) IRIS CLOSE CONTROL
Q13 BUFFER
Q24, Q25 AMP
IC4(c) AMP
VR8 PEAK/AVERAGE
VR10 ALC GAIN
VR8 VR10
IC4(a) AMP
VR9 VR17
VR9 ALC LEVEL PRESET
VR17 ALC LEVEL
Q29, Q30 HUNTING CONTROL
VR11 ANTI-CLOSE
VR11
Q15, D4 ANTI - CLOSE
IC5(a) 1/2 OPEN CONT
IC5(b) 1/2 CLOSE CONT
TP6
IC5(c) AUTO/REMOTE SELECT
TP6 (IRIS CONT)
Q18, D3(b) IRIS CLOSE CONTROL
+12V
Q19, Q20, D5 +12V REGULATOR
Q21, D6 AUTO/MANUAL SELECT
Q16 IRIS REMOTE CONTROL
Q17 AUTO/REMOTE SELECT
BI1
① GROUND
② IRIS F OUT
③ RETURN CONT OUT
④ LENS CLOSE IN
⑤ REC TRIGGER OUT
⑥ 1/2 IRIS OPEN OUT
⑦ 1/2 IRIS CLOSE OUT
⑧ VD IN
⑨ DETAIL H/L OUT
⑩ DETAIL ON/OFF OUT
⑪ NOT USED
⑫ INDICATOR ON/OFF OUT
To MOTHER BOARD --CN6
CN1
1 VTR START/STOP IN
2 1/2 IRIS CLOSE IN
3 1/2 IRIS OPEN IN
To FRONT SWITCH BOARD --B12
CN2
1 IRIS CONT OUT
2 +12V OUT
3 AUTO/MANUAL OUT
4 IRIS F IN
5 RETURN CONT IN
6 A/REM OUT
7 VTR START/STOP IN
8 8-PIN REC TRIGGER IN
9 GROUND
10 IRIS VIDEO OUT
To 12-PIN LENS CONNECTOR
BI3
① HD IN
② VCP IN
③ +5.1V IN
④ CAM SC PHASE OUT
⑤ SC COARSE-1 OUT
⑥ SC COARSE-2 OUT
⑦ CAM H PHASE OUT
⑧ REC TIME RESET OUT
⑨ +12V IN
⑩ +9V IN
⑪ IRIS REMOTE IN
+5.1V
To MOTHER BOARD --CN5
A B C D E F G H
IC6, Q22, Q23 VTR REC CONTROL
+5.1V
VR12 VR13 VR14
VR12 TOTAL PEDESTAL
VR13 R GAIN
VR14 B GAIN
SW1 ON OFF
SW3 H L OFF
SW1 LEVEL INDICATOR ON/OFF SWITCH
SW3 DETAIL H/L/OFF SWITCH
+5.1V
VR15 VR16
VR15 H, PHASE
VR16 SC PHASE
SW5 1 2
SW6 3 4
SW4
SW5 SC COARSE-1 SWITCH
SW6 SC COARSE-2 SWITCH
SW4 RECTIME RESET SWITCH

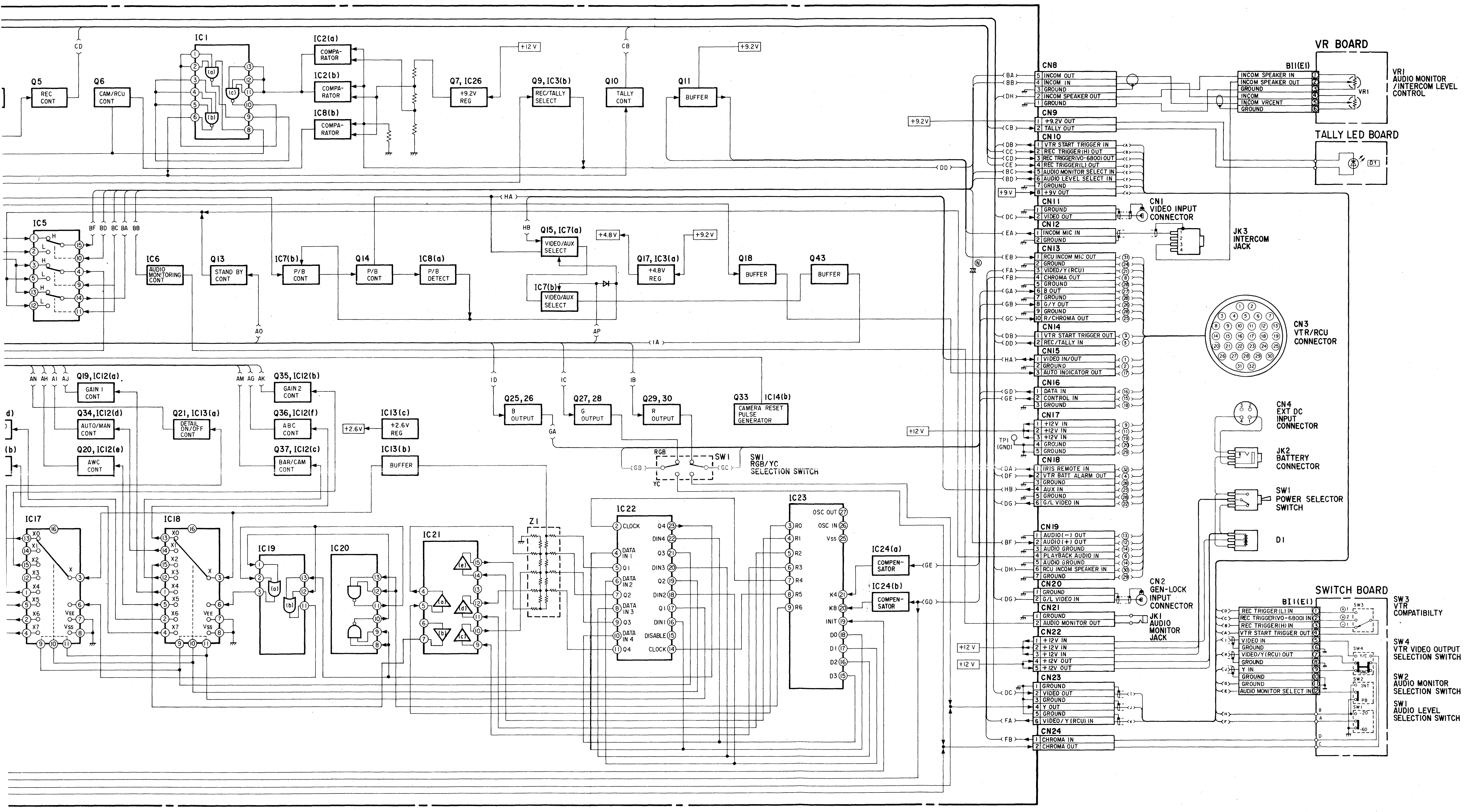
BLOCK DIAGRAM OF POWER BOARD


POWER BOARD
OVER CURRENT PROTECTOR
Q1, IC2(c), IC1(a)
IC4(c), Q5
OVER CURRENT PROTECTOR
SAWTOOTH GENERATOR
IC1(b), D2
SAWTOOTH GENERATOR
PEFERENCE VOLTAGE
IC2(a), D5
REFERENCE VOLTAGE GENERATOR
D1, 3, 7
STAND BY CONTROL
+9.2V REGULATOR
IC2(b)
DC AMP
IC1(d)
CONVERTER
C7, C8, L1
DECOUPLING
Q2, 3, 4
SWITCHING
D4, D13, L2
RECTIFIER
L3, C13
RIPPLE FILTER
TP1
(+9.2V)
+9.2V
VR1
+9.2V
ADJ
+5.1V REGULATOR
IC2(d)
DC AMP
IC1(c)
CONVERTER
L4, C19
DECOUPLING
Q6, 7
SWITCHING
D8, L5, C22
RECTIFIER
L6, C23
RIPPLE FILTER
TP3
(+5.1V)
+5.1V
VR3
+5.1V
ADJ
+20.9V REGULATOR
IC3(c)
IC3(d)
DC AMP
IC4(d)
CONVERTER
L7, C25
DECOUPLING
L8, Q9
SWITCHING
Q9, C26
RECTIFIER
L9, C27
RIPPLE FILTER
TP4
(+20.9V)
+20.9V
VR4
+20.9V
ADJ
-8V REGULATOR
IC3(b)
DC AMP
IC4(b)
CONVERTER
L10, C3
DECOUPLING
Q10, 11, L11
SWITCHING
D10, C33
RECTIFIER
L12, C34
RIPPLE FILTER
TP5
(-8V)
-8V
VR5
-8V
ADJ
-4.8V REGULATOR
IC3(a)
DC AMP
IC4(a)
CONVERTER
L13, C37
DECOUPLING
Q12, 13, L14
SWITCHING
D11, C40
RECTIFIER
L15, C41
RIPPLE FILTER
TP6
(-4.8V)
-4.8V
VR6
-4.8V
ADJ
CN1
GROUND 1
GROUND 2
+12V IN 3
+12V IN 4
GROUND 5
GROUND 6
HD IN 7
GROUND 8
+9.2V OUT 9
+9.2V OUT 10
+9.2V OUT 11
+9.2V OUT 12
+5.1V OUT 13
+5.1V OUT 14
-4.8V OUT 15
-4.8V OUT 16
-8V OUT 17
-8V OUT 18
+20.9V OUT 19
+20.9V OUT 20
GROUND 21
STANDBY IN 22
GROUND 23
GROUND 24
+9.2V
+5.1V
-4.8V
-8V
+20.9V
To MOTHER BOARD
CN107

BLOCK DIAGRAM OF CAMERA ADAPTOR

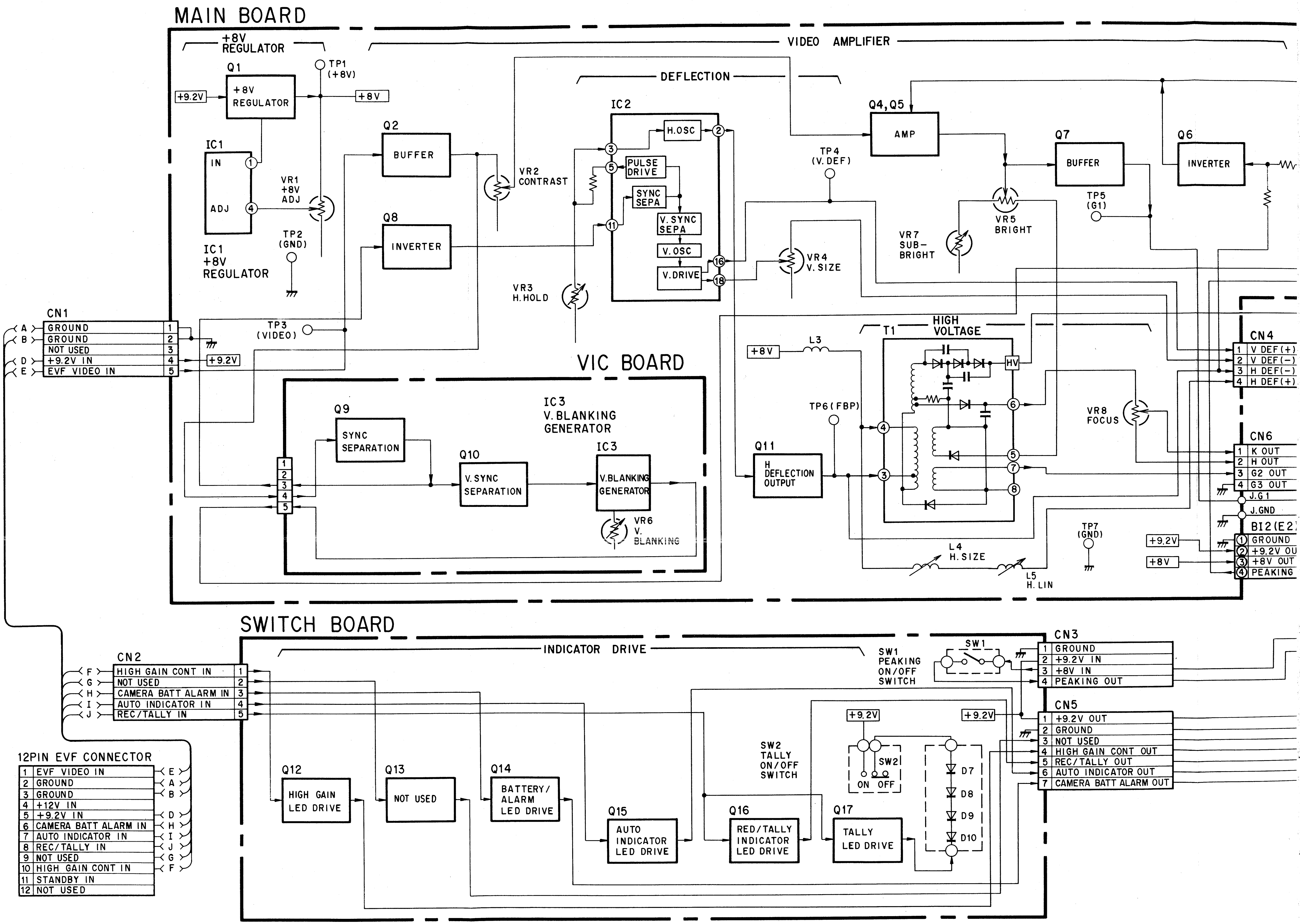

MIC BOARD
CN1 MIC CONNECTOR
CN1
BI1(E1)
① GROUND
② MIC (−) OUT
③ MIC (+) OUT
50PIN CONNECTION BOARD
CN1
RCU B GAIN CONT OUT 1
RCU R GAIN CONT OUT 2
RCU TOTAL PEDESTAL OUT 3
Y IN 4
RCU R PEDESTAL OUT 5
NOT USED 6
RCU B PEDESTAL OUT 7
NOT USED 8
RCU CAMERA/BAR SELECT OUT 9
RCU H PHASE OUT 10
+9V OUT 11
RCU GAIN-2 OUT 12
RCU GAIN-1 OUT 13
PED AUTO/MAN SELECT OUT 14
RCU AWC OUT 15
RCU ABC OUT 16
VTR VIDEO IN 17
GROUND 18
G/L VIDEO OUT 19
GROUND 20
+12V OUT 21
+12V OUT 22
VIDEO IN 23
GROUND 24
VTR BATT ALARM IN 25
REC/TALLY OUT 26
REC ALARM OUT 27
REC TRIGGER IN 28
RETURN VIDEO OUT 29
COMPOSITE SYNC IN 30
CAMERA/RCU SELECT ONT 31
AUTO INDICATOR IN 32
RCU DETAIL ON/OFF OUT 33
+9.2V IN 34
+9.2V IN 35
AUDIO OUT 36
RCU B IN 37
RCU G IN 38
RCU R IN 39
IRIS REMOTE OUT 40
GROUND 41
GROUND 42
+12V OUT 43
−4.8V IN 44
RETURN CONT IN 45
STANDBY CONT IN 46
COMPOSITE BLANKING IN 47
TRIGGER INHIBIT IN 48
YH IN 49
CHROMA IN 50
BI1(E1)
① RCU B GAIN CONT IN
② RCU R GAIN CONT IN
③ RCU TOTAL PEDESTAL IN
④ RCU R PEDESTAL IN
⑤ RCU B PEDESTAL IN
BI2(E2)
① RCU CAMERA/BAR SELECT IN
② RCU H. PHASE IN
③ +9V IN
④ RCU GAIN-2 IN
⑤ RCU GAIN-1 IN
⑥ PED AUTO/MAN SELECT IN
⑦ RCU AWC IN
⑧ RCU ABC IN
⑨ VTR VIDEO OUT
⑩ GROUND
⑪ G/L VIDEO IN
⑫ GROUND
BI3(E3)
① +12V IN
② +12V IN
③ VIDEO OUT
④ GROUND
⑤ VTR BATT ALARM OUT
⑥ REC ALARM IN
⑦ REC TRIGGER OUT
⑧ RETURN VIDEO IN
⑨ CAMERA/RCU SELECT IN
⑩ AUTO INDICATOR OUT
⑪ REC/TALLY IN
BI4(E4)
① RCU DETAIL ON/OFF IN
② +9.2V OUT
③ +9.2V OUT
④ AUDIO IN
⑤ RCU B OUT
⑥ RCU G OUT
⑦ IRIS R OUT
⑧ IRIS REMOTE IN
⑨ GROUND
⑩ GROUND
BI5(E5)
① +12V IN
② −4.8V OUT
③ RETURN CONT OUT
④ STANDBY CONT OUT
⑤ TRIGGER INHIBIT OUT
⑥ YH OUT
⑦ CHROMA OUT
MAIN BOARD
CN1
GROUND 1
MIC (−) IN 2 A
MIC (+) IN 3 B
CN2
RCU B PEDESTAL OUT 1 AA
RCU R PEDESTAL OUT 2 AB
RCU TOTAL PEDESTAL OUT 3 AC
RCU R GAIN CONT OUT 4 AD
RCU B GAIN CONT OUT 5 AE
CN3
GROUND 1
G/L VIDEO OUT 2 DG
GROUND 3
VTR VIDEO IN 4
RCU ABC OUT 5 AG
RCU AWC OUT 6 AH
PED AUTO/MAN SELECT OUT 7 AI
RCU GAIN-1 OUT 8 AJ
RCU GAIN-2 OUT 9 AK
+9V OUT 10
RCU H. PHASE OUT 11 AL
RCU CAMERA/BAR SELECT OUT 12 AH
CN4
REC/TALLY OUT 1
AUTO INDICATOR IN 2
CAMERA/RCU SELECT OUT 3
RETURN VIDEO OUT 4 IA
REC TRIGGER IN 5 JA
REC ALARM OUT 6 JB
VTR BATT ALARM IN 7 DF
GROUND 8
VIDEO IN 9 DC
+12V OUT 10 DI
+12V OUT 11
CN5
GROUND 1
GROUND 2
IRIS REMOTE OUT 3 DA
RCU R IN 4 IB
RCU G IN 5 IC
RCU B IN 6 ID
AUDIO OUT 7
+9.2V IN 8
+9.2V IN 9
RCU DETAIL ON/OFF OUT 10 AN
CN6
CHROMA IN 1 HA
YH IN 2 HB
TRIGGER INHIBIT IN 3
STANDBY CONT IN 4 AO
RETURN CONT IN 5 AP
−4.8V IN 6
+12V OUT 7
CE
CC
CD
Q2, 3
REC TRIGGER(L) CONT
IC25, Q4
REC TRIGGER(H) CONT
Q5
REC CONT
Q6
CAM/RCU CONT
IC1
(a)
(b)
(c)
IC2(a)
COMPA-RATOR
IC2(b)
COMPA-RATOR
IC8(b)
COMPA-RATOR
+12 V
Q7, IC26
+9.2V REG
Q9, IC3(b)
REC/TALLY SELECT
CB
Q10
TALLY CONT
+9.2V
Q11
BUFFER
JA
JB
HA
+9 V
B
A
IC4
AUDIO AMP
Q12
AUDIO AMP
IC5
H
L
BF BD BC BA BB
IC6
AUDIO MONITORING CONT
Q13
STAND BY CONT
AO
IC7(b)
P/B CONT
Q14
P/B CONT
IC8(a)
P/B DETECT
HB
Q15, IC7(a)
VIDEO/AUX SELECT
IC7(b)
VIDEO/AUX SELECT
AP
+4.8V
Q17, IC3(a)
+4.8V REG
+9.2V
Q18
BUFFER
Q43
BUFFER
IA
AE
IC9(a), 10(b)
B GAIN CONT
+9.2V
AD
IC9(b), 10(a)
R GAIN CONT
AB
IC9(d), 10(c)
R PED CONT
−4.8V
AL
IC9(c), 10(d)
H PHASE CONT
+12 V
AC
IC11(c), (d)
TOTALPED CONT
AA
IC11(a), (b)
B PED CONT
AN AH AI AJ
Q19, IC12(a)
GAIN 1 CONT
Q34, IC12(d)
AUTO/MAN CONT
Q20, IC12(e)
AWC CONT
Q21, IC13(a)
DETAIL ON/OFF CONT
AM AG AK
Q35, IC12(b)
GAIN 2 CONT
Q36, IC12(f)
ABC CONT
Q37, IC12(c)
BAR/CAM CONT
+2.6V
IC13(c)
+2.6V REG
IC13(b)
BUFFER
ID
IC
IB
Q25, 26
B OUTPUT
Q27, 28
G OUTPUT
Q29, 30
R OUTPUT
GA
Q33
IC14(b)
CAMERA RESET PULSE GENERATOR
RGB
SW1
GB
GC
YC
SW1 RGB/YC SELECTION SWITCH
IC17
IC18
X0 X1 X2 X3 X4 X5 X6 X7
X
VEE
VSS
IC19
IC20
IC21
(a) (b) (c) (d) (e)
Z1
IC22
CLOCK
DATA IN 1
Q1
DATA IN 2
Q2
DATA IN 3
Q3
DATA IN 4
Q4
DIN4
DIN3
DIN2
DIN1
DISABLE
IC23
R0 R1 R2 R3 R4 R5 R6
OSC OUT
OSC IN
Vss
K4
K8
INIT
D0 D1 D2 D3
IC24
COM SATC
TP2 (+9V)
Q31, IC14(a)
RCU/CAMERA DETECT
Q8, 32, IC15
RCU POWER CONT
VR1 +9V ADJ
+12 V
Q42, IC16
RCU RESET PULSE GENERATOR
HB
Q40, 41
AMP
HA
Q38, 39
AMP

BLOCK DIAGRAM OF CAMERA ADAPTOR

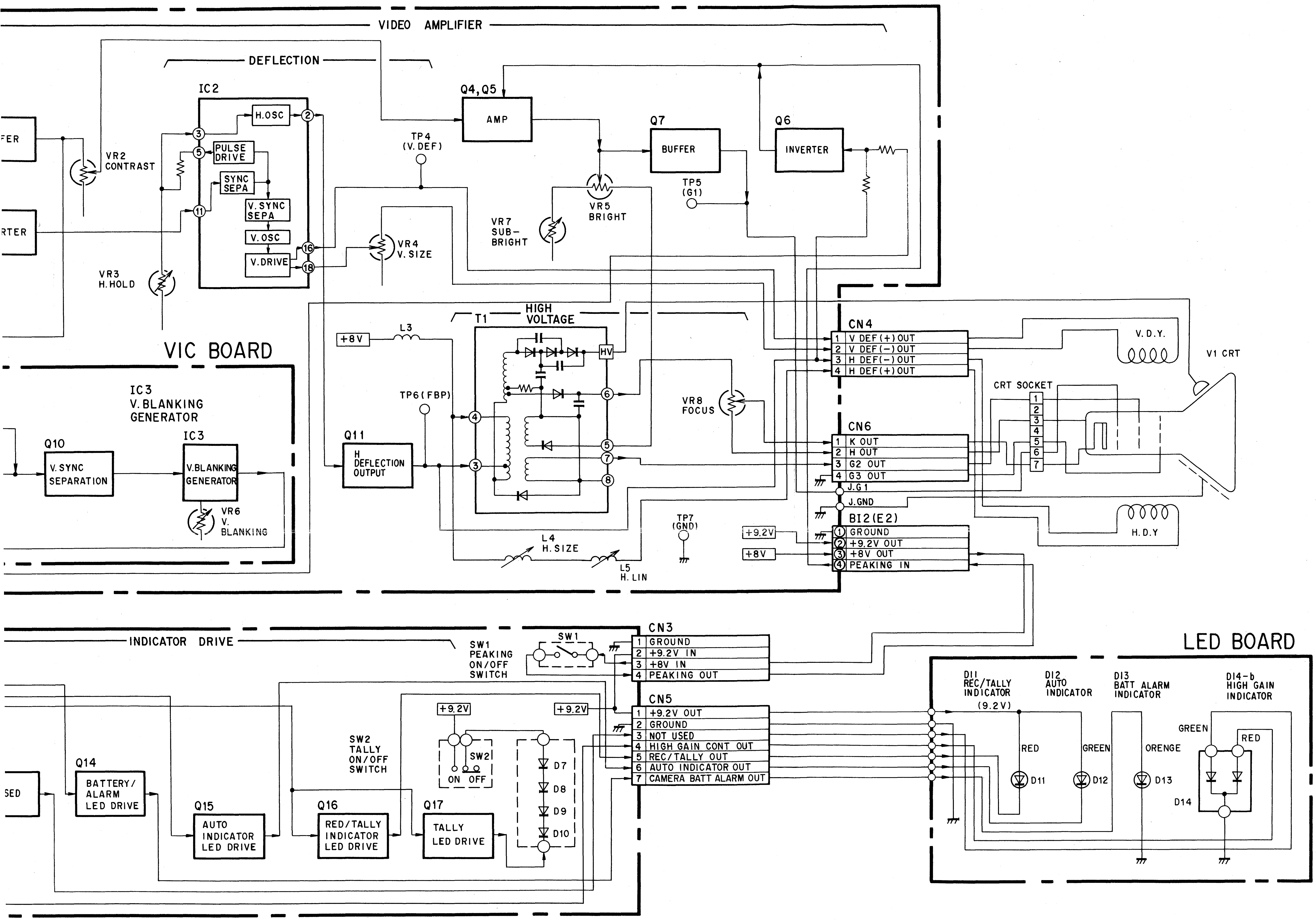


Q5
REC CONT
Q6
CAM/RCU CONT
IC1
IC2(a)
COMPA-RATOR
IC2(b)
COMPA-RATOR
IC8(b)
COMPA-RATOR
Q7, IC26
+9.2V REG
+12 V
Q9, IC3(b)
REC/TALLY SELECT
Q10
TALLY CONT
Q11
BUFFER
+9.2V
CD
CB
IC5
IC6
AUDIO MONITORING CONT
Q13
STAND BY CONT
IC7(b)
P/B CONT
Q14
P/B CONT
IC8(a)
P/B DETECT
HB
Q15, IC7(a)
VIDEO/AUX SELECT
IC7(b)
VIDEO/AUX SELECT
+4.8V
Q17, IC3(a)
+4.8V REG
Q18
BUFFER
Q43
BUFFER
BF BD BC BA BB
AO
AP
HA
IA
Q19, IC12(a)
GAIN 1 CONT
Q34, IC12(d)
AUTO/MAN CONT
Q20, IC12(e)
AWC CONT
Q21, IC13(a)
DETAIL ON/OFF CONT
Q35, IC12(b)
GAIN 2 CONT
Q36, IC12(f)
ABC CONT
Q37, IC12(c)
BAR/CAM CONT
IC13(c)
+2.6V REG
+2.6V
IC13(b)
BUFFER
ID
IC
IB
Q25, 26
B OUTPUT
Q27, 28
G OUTPUT
Q29, 30
R OUTPUT
Q33
IC14(b)
CAMERA RESET PULSE GENERATOR
GA
RGB
YC
SW1
SW1 RGB/YC SELECTION SWITCH
IC17
IC18
IC19
IC20
IC21
Z1
IC22
CLOCK
DATA IN 1
DATA IN 2
DATA IN 3
DATA IN 4
Q1 Q2 Q3 Q4
DIN1 DIN2 DIN3 DIN4
DISABLE
IC23
OSC OUT
OSC IN
VSS
R0 R1 R2 R3 R4 R5 R6
K4 K8 INIT D0 D1 D2 D3
IC24(a)
COMPEN-SATOR
IC24(b)
COMPEN-SATOR
GE
GD
CN8
INCOM OUT
INCOM IN
GROUND
INCOM SPEAKER OUT
GROUND
CN9
+9.2V OUT
TALLY OUT
CN10
VTR START TRIGGER IN
REC TRIGGER(H) OUT
REC TRIGGER(VO-6800) OUT
REC TRIGGER(L) OUT
AUDIO MONITOR SELECT IN
AUDIO LEVEL SELECT IN
GROUND
+9V OUT
+9V
CN11
GROUND
VIDEO OUT
CN1 VIDEO INPUT CONNECTOR
CN12
INCOM MIC IN
GROUND
JK3 INTERCOM JACK
CN13
RCU INCOM MIC OUT
GROUND
VIDEO/Y (RCU)
CHROMA OUT
GROUND
B OUT
GROUND
G/Y OUT
GROUND
R/CHROMA OUT
CN14
VTR START TRIGGER OUT
REC/TALLY IN
CN15
VIDEO IN/OUT
GROUND
AUTO INDICATOR OUT
CN16
DATA IN
CONTROL IN
GROUND
CN17
+12V IN
+12V IN
+12V IN
GROUND
GROUND
TP1 (GND)
CN18
IRIS REMOTE IN
VTR BATT ALARM OUT
GROUND
AUX IN
GROUND
G/L VIDEO IN
CN19
AUDIO(−) OUT
AUDIO(+) OUT
AUDIO GROUND
PLAYBACK AUDIO IN
AUDIO GROUND
RCU INCOM SPEAKER IN
GROUND
CN20
GROUND
G/L VIDEO IN
CN2 GEN-LOCK INPUT CONNECTOR
CN21
GROUND
AUDIO MONITOR OUT
JK1 AUDIO MONITOR JACK
CN22
+12V IN
+12V IN
+12V IN
+12V OUT
+12V OUT
CN23
GROUND
VIDEO OUT
GROUND
Y OUT
GROUND
VIDEO/Y (RCU) IN
CN24
CHROMA IN
CHROMA OUT
CN3 VTR/RCU CONNECTOR
VR BOARD
B11(E1)
INCOM SPEAKER IN
INCOM SPEAKER OUT
GROUND
INCOM
INCOM VRCENT
GROUND
VR1
VR1 AUDIO MONITOR /INTERCOM LEVEL CONTROL
TALLY LED BOARD
D1
CN4 EXT DC INPUT CONNECTOR
JK2 BATTERY CONNECTOR
SW1 POWER SELECTOR SWITCH
D1
SWITCH BOARD
B11(E1)
REC TRIGGER(L) IN
REC TRIGGER(VO-6800) IN
REC TRIGGER(H) IN
VTR START TRIGGER OUT
VIDEO IN
GROUND
VIDEO/Y(RCU) OUT
GROUND
Y IN
GROUND
GROUND
AUDIO MONITOR SELECT IN
SW3
SW4
SW2
SW1
INT
PB
−20
−60
SW3 VTR COMPATIBILTY
SW4 VTR VIDEO OUTPUT SELECTION SWITCH
SW2 AUDIO MONITOR SELECTION SWITCH
SW1 AUDIO LEVEL SELECTION SWITCH

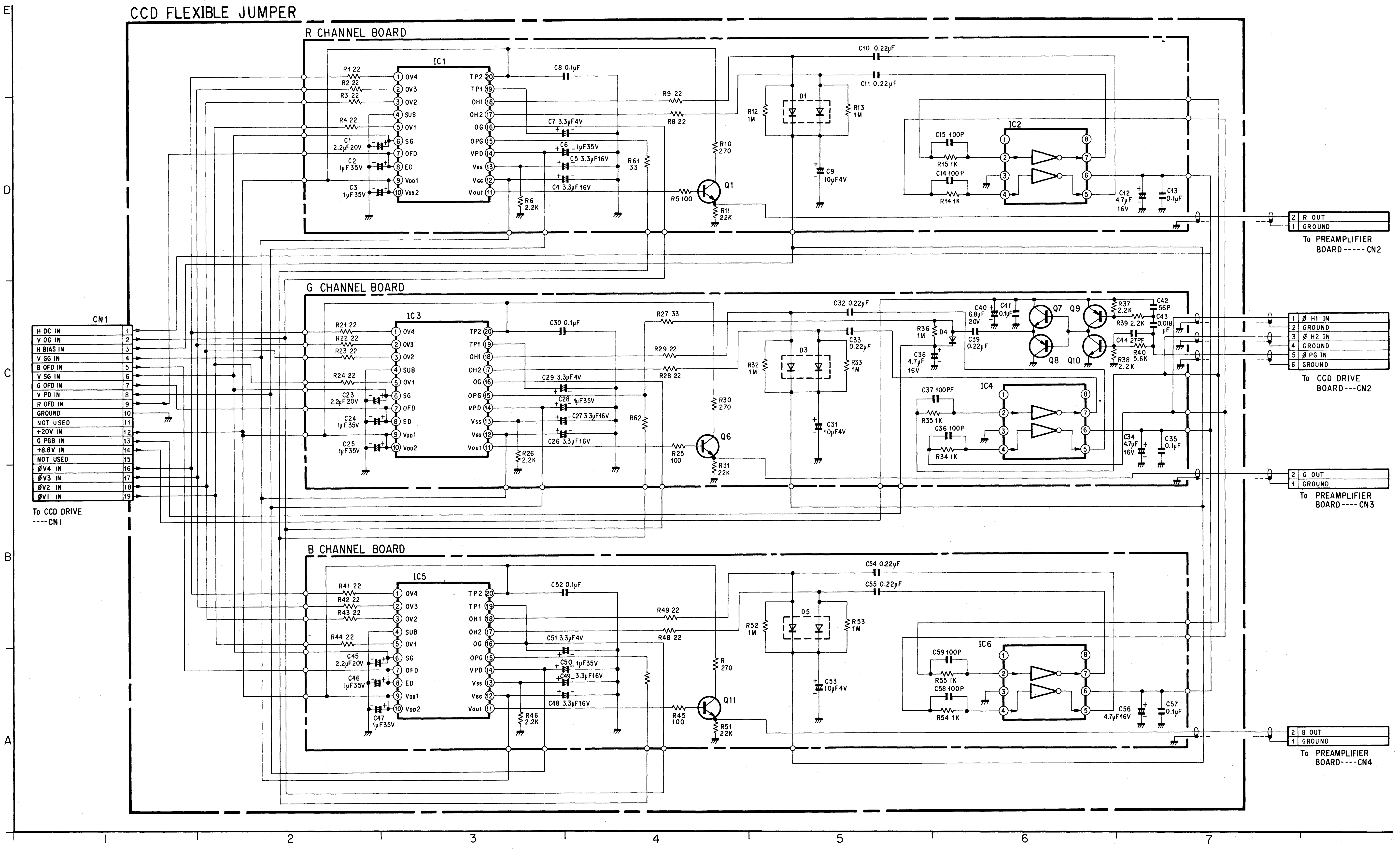
BLOCK DIAGRAM OF 1.5" VIEWFINDER WV-VF38


MAIN BOARD
+8V REGULATOR
VIDEO AMPLIFIER
Q1
+8V REGULATOR
+9.2V
+8V
TP1 (+8V)
IC1
IN
ADJ
IC1 +8V REGULATOR
VR1 +8V ADJ
TP2 (GND)
Q2
BUFFER
Q8
INVERTER
VR2 CONTRAST
DEFLECTION
IC2
H.OSC
PULSE DRIVE
SYNC SEPA
V.SYNC SEPA
V.OSC
V.DRIVE
VR3 H.HOLD
VR4 V.SIZE
TP4 (V.DEF)
Q4,Q5
AMP
Q7
BUFFER
Q6
INVERTER
VR5 BRIGHT
VR7 SUB-BRIGHT
TP5 (G1)
CN1
GROUND
GROUND
NOT USED
+9.2V IN
EVF VIDEO IN
A
B
D
E
TP3 (VIDEO)
VIC BOARD
Q9
SYNC SEPARATION
Q10
V.SYNC SEPARATION
IC3 V.BLANKING GENERATOR
IC3
V.BLANKING GENERATOR
VR6 V.BLANKING
+8V
L3
TP6 (FBP)
Q11
H DEFLECTION OUTPUT
T1
HIGH VOLTAGE
HV
VR8 FOCUS
L4 H.SIZE
L5 H.LIN
TP7 (GND)
CN4
1 V DEF(+)
2 V DEF(−)
3 H DEF(−)
4 H DEF(+)
CN6
1 K OUT
2 H OUT
3 G2 OUT
4 G3 OUT
J.G1
J.GND
B12(E2
① GROUND
② +9.2V OU
③ +8V OUT
④ PEAKING
+9.2V
+8V
SWITCH BOARD
INDICATOR DRIVE
CN2
1 HIGH GAIN CONT IN
2 NOT USED
3 CAMERA BATT ALARM IN
4 AUTO INDICATOR IN
5 REC/TALLY IN
F
G
H
I
J
12PIN EVF CONNECTOR
1 EVF VIDEO IN — E
2 GROUND — A
3 GROUND — B
4 +12V IN
5 +9.2V IN — D
6 CAMERA BATT ALARM IN — H
7 AUTO INDICATOR IN — I
8 REC/TALLY IN — J
9 NOT USED — G
10 HIGH GAIN CONT IN — F
11 STANDBY IN
12 NOT USED
Q12
HIGH GAIN LED DRIVE
Q13
NOT USED
Q14
BATTERY/ ALARM LED DRIVE
Q15
AUTO INDICATOR LED DRIVE
Q16
RED/TALLY INDICATOR LED DRIVE
Q17
TALLY LED DRIVE
SW1 PEAKING ON/OFF SWITCH
SW1
SW2 TALLY ON/OFF SWITCH
SW2
ON OFF
+9.2V
+9.2V
D7
D8
D9
D10
CN3
1 GROUND
2 +9.2V IN
3 +8V IN
4 PEAKING OUT
CN5
1 +9.2V OUT
2 GROUND
3 NOT USED
4 HIGH GAIN CONT OUT
5 REC/TALLY OUT
6 AUTO INDICATOR OUT
7 CAMERA BATT ALARM OUT

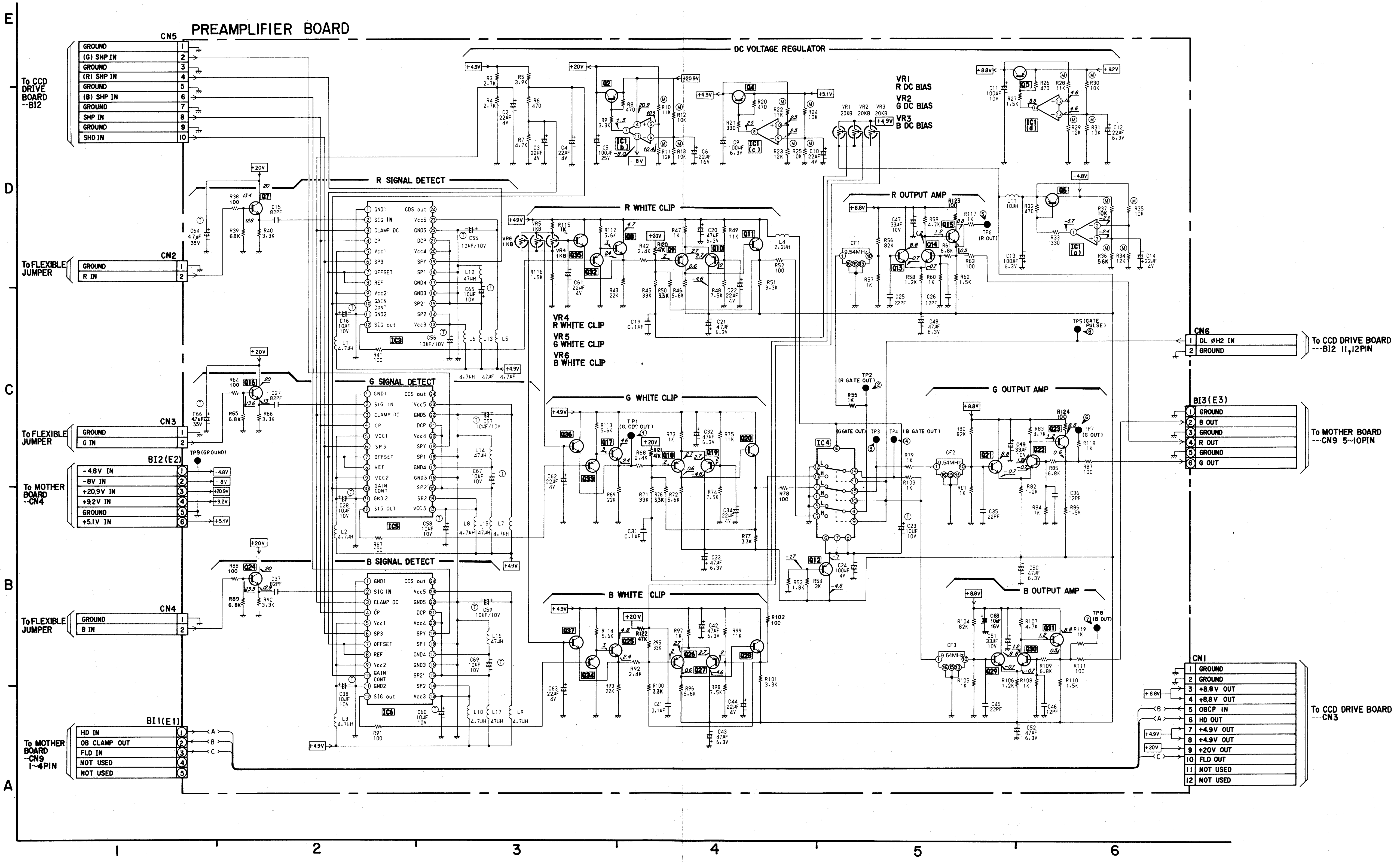
BLOCK DIAGRAM OF 1.5″ VIEWFINDER WV-VF38


VIDEO AMPLIFIER
DEFLECTION
IC2
H.OSC
PULSE DRIVE
SYNC SEPA
V.SYNC SEPA
V.OSC
V.DRIVE
FER
RTER
VR2 CONTRAST
VR3 H.HOLD
Q4,Q5
AMP
TP4 (V.DEF)
Q7
BUFFER
Q6
INVERTER
VR5 BRIGHT
VR7 SUB-BRIGHT
TP5 (G1)
VR4 V.SIZE
VIC BOARD
IC3 V.BLANKING GENERATOR
IC3
Q10
V.SYNC SEPARATION
V.BLANKING GENERATOR
VR6 V. BLANKING
+8V
L3
T1
HIGH VOLTAGE
HV
TP6(FBP)
Q11
H DEFLECTION OUTPUT
VR8 FOCUS
L4 H.SIZE
L5 H.LIN
TP7 (GND)
CN4
1 V DEF(+)OUT
2 V DEF(−)OUT
3 H DEF(−)OUT
4 H DEF(+)OUT
CN6
1 K OUT
2 H OUT
3 G2 OUT
4 G3 OUT
J.G1
J.GND
B12(E2)
① GROUND
② +9.2V OUT
③ +8V OUT
④ PEAKING IN
+9.2V
+8V
V.D.Y.
V1 CRT
CRT SOCKET
H.D.Y
INDICATOR DRIVE
SW1 PEAKING ON/OFF SWITCH
SW1
CN3
1 GROUND
2 +9.2V IN
3 +8V IN
4 PEAKING OUT
CN5
1 +9.2V OUT
2 GROUND
3 NOT USED
4 HIGH GAIN CONT OUT
5 REC/TALLY OUT
6 AUTO INDICATOR OUT
7 CAMERA BATT ALARM OUT
+9.2V
SW2 TALLY ON/OFF SWITCH
SW2
ON OFF
D7
D8
D9
D10
SED
Q14
BATTERY/ ALARM LED DRIVE
Q15
AUTO INDICATOR LED DRIVE
Q16
RED/TALLY INDICATOR LED DRIVE
Q17
TALLY LED DRIVE
LED BOARD
D11 REC/TALLY INDICATOR
(9.2V)
D12 AUTO INDICATOR
D13 BATT ALARM INDICATOR
D14-b HIGH GAIN INDICATOR
RED
GREEN
ORENGE
GREEN
RED
D11
D12
D13
D14

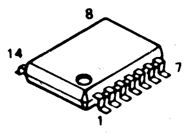
SCHEMATIC DIAGRAM OF CCD AND PRISM ASSEMBLY


CCD FLEXIBLE JUMPER
R CHANNEL BOARD
G CHANNEL BOARD
B CHANNEL BOARD
CN1
H DC IN
V OG IN
H BIAS IN
V GG IN
B OFD IN
V SG IN
G OFD IN
V PD IN
R OFD IN
GROUND
NOT USED
+20V IN
G PGB IN
+8.8V IN
NOT USED
ØV4 IN
ØV3 IN
ØV2 IN
ØV1 IN
To CCD DRIVE ----CN1
IC1
IC2
IC3
IC4
IC5
IC6
OV4
OV3
OV2
SUB
OV1
SG
OFD
ED
VDD1
VDD2
TP2
TP1
OH1
OH2
OG
OPG
VPD
Vss
VGG
Vout
R1 22
R2 22
R3 22
R4 22
C1 2.2μF20V
C2 1μF35V
C3 1μF35V
C8 0.1μF
C7 3.3μF4V
C6 1μF35V
C5 3.3μF16V
C4 3.3μF16V
R6 2.2K
R61 33
R9 22
R8 22
R10 270
R5 100
Q1
R11 22K
R12 1M
D1
R13 1M
C9 10μF4V
C10 0.22μF
C11 0.22μF
C15 100P
R15 1K
C14 100P
R14 1K
C12 4.7μF 16V
C13 0.1μF
2 R OUT
1 GROUND
To PREAMPLIFIER BOARD-----CN2
R21 22
R22 22
R23 22
R24 22
C23 2.2μF20V
C24 1μF35V
C25 1μF35V
C30 0.1μF
C29 3.3μF4V
C28 1μF35V
C27 3.3μF16V
C26 3.3μF16V
R26 2.2K
R62
R27 33
R29 22
R28 22
R30 270
Q6
R25 100
R31 22K
R32 1M
D3
R33 1M
C31 10μF4V
C32 0.22μF
C33 0.22μF
R36 1M
D4
C38 4.7μF 16V
C39 0.22μF
C40 6.8μF 20V
C41 0.1μF
Q7
Q8
Q9
Q10
R37 2.2K
R39 2.2K
C42 56P
C43 0.018μF
C44 27PF
R40 5.6K
R38 2.2K
C37 100PF
R35 1K
C36 100P
R34 1K
C34 4.7μF 16V
C35 0.1μF
1 Ø H1 IN
2 GROUND
3 Ø H2 IN
4 GROUND
5 Ø PG IN
6 GROUND
To CCD DRIVE BOARD---CN2
2 G OUT
1 GROUND
To PREAMPLIFIER BOARD----CN3
R41 22
R42 22
R43 22
R44 22
C45 2.2μF20V
C46 1μF35V
C47 1μF35V
C52 0.1μF
C51 3.3μF4V
C50 1μF35V
C49 3.3μF16V
C48 3.3μF16V
R46 2.2K
R49 22
R48 22
R 270
Q11
R45 100
R51 22K
R52 1M
D5
R53 1M
C53 10μF4V
C54 0.22μF
C55 0.22μF
C59 100P
R55 1K
C58 100P
R54 1K
C56 4.7μF16V
C57 0.1μF
2 B OUT
1 GROUND
To PREAMPLIFIER BOARD----CN4
E
D
C
B
A
1
2
3
4
5
6
7

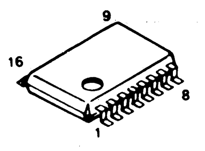
SCHEMATIC DIAGRAM OF PREAMPLIFIER BOARD


PREAMPLIFIER BOARD
E
D
C
B
A
1
2
3
4
5
6
CN5
GROUND 1
(G) SHP IN 2
GROUND 3
(R) SHP IN 4
GROUND 5
(B) SHP IN 6
GROUND 7
SHP IN 8
GROUND 9
SHD IN 10
To CCD DRIVE BOARD --BI2
CN2
GROUND 1
R IN 2
To FLEXIBLE JUMPER
CN3
GROUND 1
G IN 2
To FLEXIBLE JUMPER
TP9 (GROUND)
BI2 (E2)
-4.8V IN 1
-8V IN 2
+20.9V IN 3
+9.2V IN 4
GROUND 5
+5.1V IN 6
To MOTHER BOARD --CN4
CN4
GROUND 1
B IN 2
To FLEXIBLE JUMPER
BI1 (E1)
HD IN 1
OB CLAMP OUT 2
FLD IN 3
NOT USED 4
NOT USED 5
To MOTHER BOARD --CN9 1~4PIN
DC VOLTAGE REGULATOR
VR1 R DC BIAS
VR2 G DC BIAS
VR3 B DC BIAS
R SIGNAL DETECT
G SIGNAL DETECT
B SIGNAL DETECT
IC3
IC5
IC6
GND1
SIG IN
CLAMP DC
CP
Vcc1
SP3
OFFSET
REF
Vcc2
GAIN CONT
GND2
SIG out
CDS out
Vcc5
GND5
DCP
Vcc4
SPY
SP1
GND4
GND3
SP2'
SP2
Vcc3
R WHITE CLIP
G WHITE CLIP
B WHITE CLIP
VR4 R WHITE CLIP
VR5 G WHITE CLIP
VR6 B WHITE CLIP
TP1 (G. CDS OUT)
R OUTPUT AMP
G OUTPUT AMP
B OUTPUT AMP
TP6 (R OUT)
TP7 (G OUT)
TP8 (B OUT)
TP2 (R GATE OUT)
TP3 (G GATE OUT)
TP4 (B GATE OUT)
TP5 (GATE PULSE)
IC4
IC1 (a)
IC1 (b)
IC1 (c)
IC1 (d)
CF1 3.54MHz
CF2 3.54MHz
CF3 3.54MHz
CN6
1 DL ØH2 IN
2 GROUND
To CCD DRIVE BOARD ---BI2 11,12PIN
BI3 (E3)
1 GROUND
2 B OUT
3 GROUND
4 R OUT
5 GROUND
6 G OUT
To MOTHER BOARD ---CN9 5~10PIN
CN1
1 GROUND
2 GROUND
3 +8.8V OUT
4 +8.8V OUT
5 OBCP IN
6 HD OUT
7 +4.9V OUT
8 +4.9V OUT
9 +20V OUT
10 FLD OUT
11 NOT USED
12 NOT USED
To CCD DRIVE BOARD ---CN3
+4.9V
+20V
+20.9V
+5.1V
+8.8V
+9.2V
-4.8V
-8V

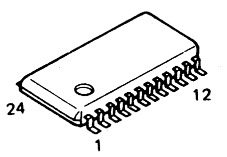
UPC4064G2



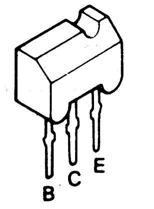
MN74HC4053S



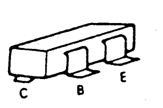
M51266FP



2SB793A-RS

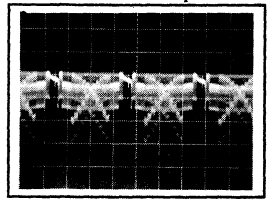


2SC2404-CDTW
2SD601-RS
2SA1226-E3
2SB710-Q
2SB709-Q

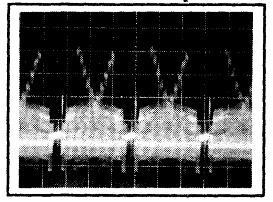


IC1	UPC4064G2	D6	Q8	2SD601-RS	D3	Q18	2SA1226-E3	C4	Q28	2SD601-RS	B4
IC3	M51266FP	D2	Q9	2SA1226-E3	D4	Q19	2SA1226-E3	C4	Q29	2SC2404-CDTW	B5
IC4	MN74HC4053S	B5	Q10	2SA1226-E3	D4	Q20	2SD601-RS	C4	Q30	2SC2404-CDTW	B6
IC5	M51266FP	D2	Q11	2SD601-RS	D4	Q21	2SC2404-CDTW	C5	Q31	2SD601-QR	B6
IC6	M51266FP	B2	Q12	2SB710-Q	B4	Q22	2SC2404-CDTW	C6	Q32	2SB709-Q	D3
Q2	2SB793A-RS	D3	Q13	2SC2404-CDTW	D5	Q23	2SD601-RS	C6	Q33	2SB709-Q	C3
Q4	2SB793A-RS	D4	Q14	2SC2404-CDTW	D5	Q24	2SC2404-CDTW	B2	Q34	2SB709-Q	B3
Q5	2SB793A-RS	E5	Q15	2SD601-RS	D5	Q25	2SD601-RS	B3	Q35	2SD601-RS	D3
Q6	2SB793A-RS	D6	Q16	2SC2404-CDTW	C2	Q26	2SA1226-E3	B4	Q36	2SD601-RS	C3
Q7	2SC2404-CDTW	D2	Q17	2SD601-RS	C3	Q27	2SA1226-E3	B4	Q37	2SD601-RS	B3

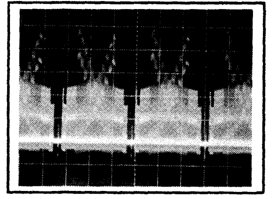
1. 50mV/DIV , 20μs/DIV



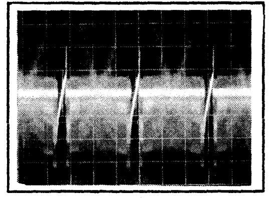
2. 50mV/DIV , 20μs/DIV



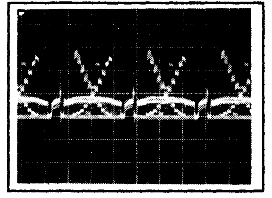
3. 0.1V/DIV , 20μs/DIV



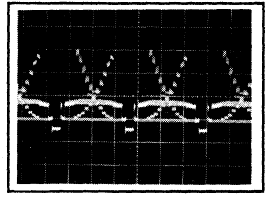
4. 20mV/DIV , 20μs/DIV



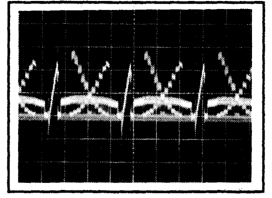
5. 0.1V/DIV , 20μs/DIV



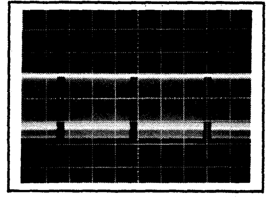
6. 0.2V/DIV , 20μs/DIV



7. 50mV/DIV , 20μs/DIV

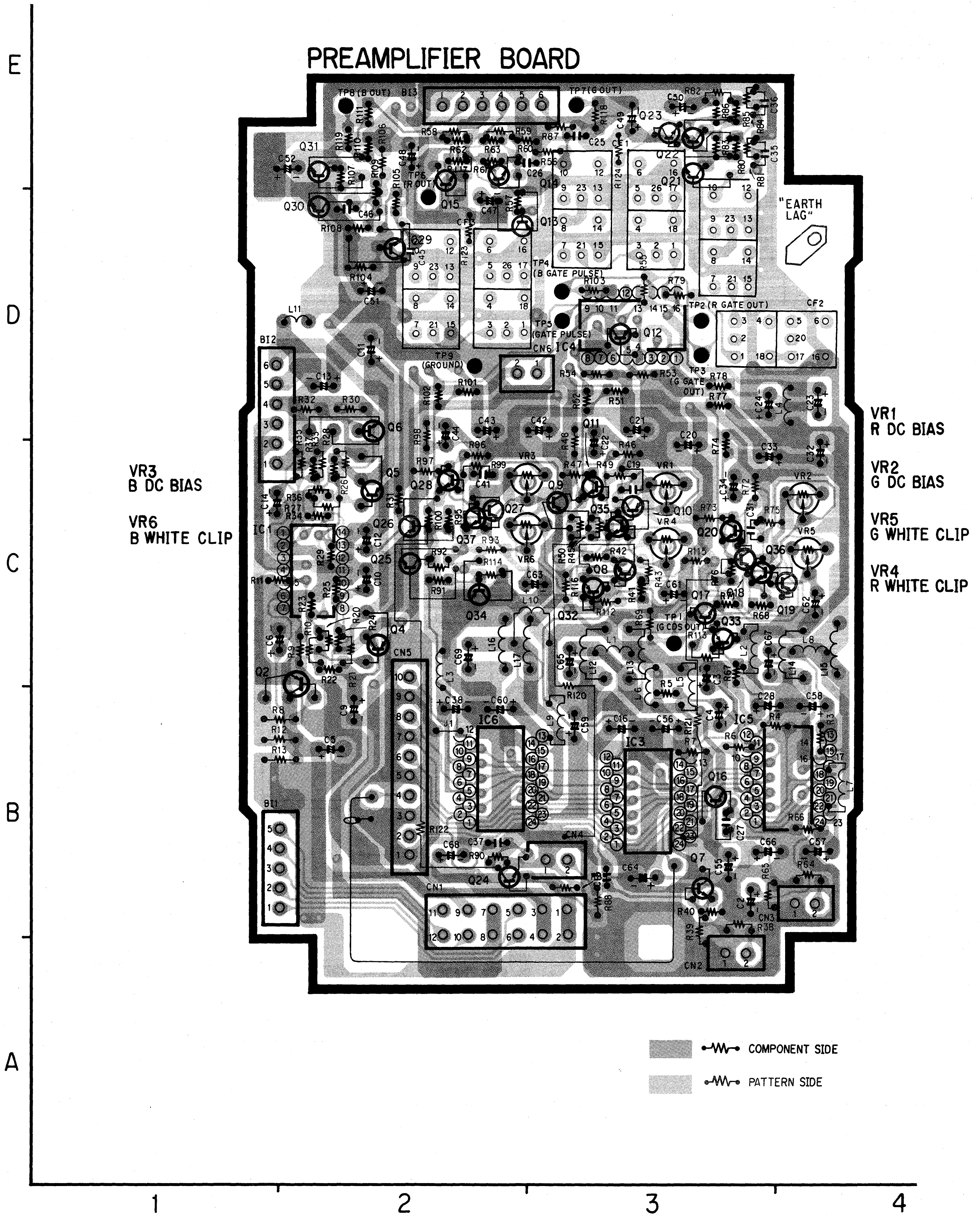


8. 2V/DIV , 20μs/DIV

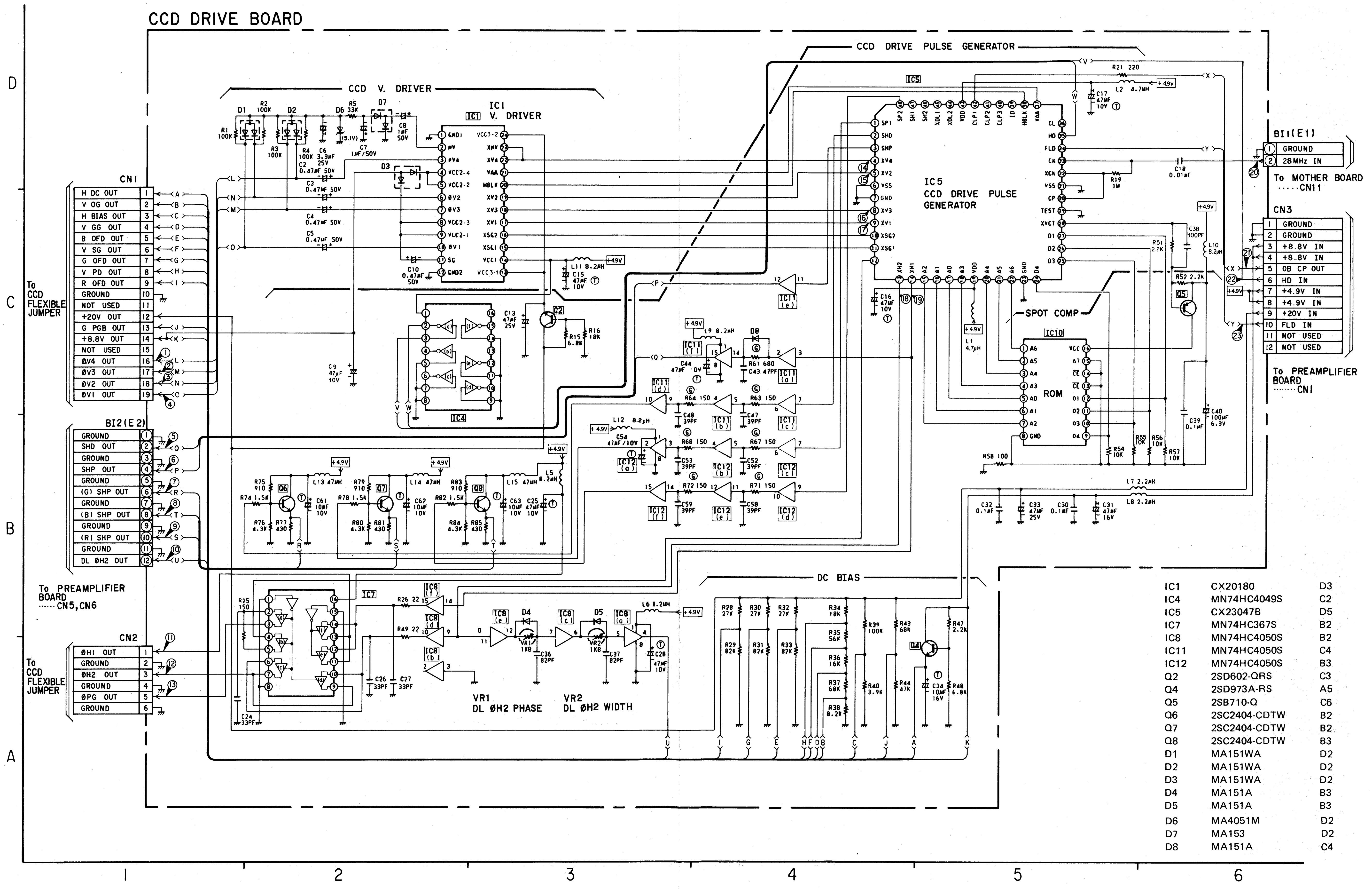


IC1	UPC4064G2	C2
IC3	M51266FP	B3
IC4	MN74HC4053S	D3
IC5	M51266FP	B3
IC6	M51266FP	B2
Q2	2SB793A-RS	C2
Q4	2SB793A-RS	C2
Q5	2SB793A-RS	C2
Q6	2SB793A-RS	D2
Q7	2SC2404-CDTW	B3
Q8	2SD601-RS	C3
Q9	2SA1226-E3	C3
Q10	2SA1226-E3	C3
Q11	2SD601-RS	C3
Q12	2SB710-Q	D3
Q13	2SC2404-CDTW.	D2
Q14	2SC2404-CDTW	E2
Q15	2SD601-RS	E2
Q16	2SC2404-CDTW	B3
Q17	2SD601-RS	C3
Q18	2SA1226-E3	C3
Q19	2SA1226-E3	C3
Q20	2SD601-RS	C3
Q21	2SC2404-CDTW	E3
Q22	2SC2404-CDTW	E3
Q23	2SD601-RS	E3
Q24	2SC2404-CDTW	B2
Q25	2SD601-RS	C2
Q26	2SA1226-E3	C2
Q27	2SA1226-E3	C2
Q28	2SD601-RS	C2
Q29	2SC2404-CDTW	D2
Q30	2SC2404-CDTW	D2
Q31	2SD601-RS	E2
Q32	2SB709-Q	C3
Q33	2SB709-Q	C3
Q34	2SB709-Q	C2
Q35	2SD601-RS	C3
Q36	2SD601-RS	C3
Q37	2SD601-RS	C2

CONDUCTOR VIEW OF PREAMPLIFIER BOARD


PREAMPLIFIER BOARD
"EARTH LAG"
VR1 R DC BIAS
VR2 G DC BIAS
VR5 G WHITE CLIP
VR4 R WHITE CLIP
VR3 B DC BIAS
VR6 B WHITE CLIP
E
D
C
B
A
1
2
3
4
COMPONENT SIDE
PATTERN SIDE

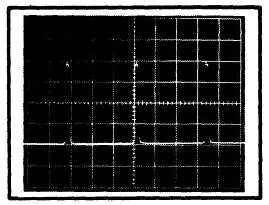
SCHEMATIC DIAGRAM OF CCD DRIVE BOARD


CCD DRIVE BOARD
CCD V. DRIVER
IC1 V. DRIVER
CCD DRIVE PULSE GENERATOR
IC5 CCD DRIVE PULSE GENERATOR
SPOT COMP
ROM
IC10
IC4
IC7
DC BIAS
VR1 DL ØH2 PHASE
VR2 DL ØH2 WIDTH
CN1
H DC OUT
V OG OUT
H BIAS OUT
V GG OUT
B OFD OUT
V SG OUT
G OFD OUT
V PD OUT
R OFD OUT
GROUND
NOT USED
+20V OUT
G PGB OUT
+8.8V OUT
NOT USED
ØV4 OUT
ØV3 OUT
ØV2 OUT
ØV1 OUT
To CCD FLEXIBLE JUMPER
BI2(E2)
GROUND
SHD OUT
GROUND
SHP OUT
GROUND
(G) SHP OUT
GROUND
(B) SHP OUT
GROUND
(R) SHP OUT
GROUND
DL ØH2 OUT
To PREAMPLIFIER BOARD ······CN5,CN6
CN2
ØH1 OUT
GROUND
ØH2 OUT
GROUND
ØPG OUT
GROUND
To CCD FLEXIBLE JUMPER
BI1(E1)
GROUND
28MHz IN
To MOTHER BOARD ·····CN11
CN3
GROUND
GROUND
+8.8V IN
+8.8V IN
OB CP OUT
HD IN
+4.9V IN
+4.9V IN
+20V IN
FLD IN
NOT USED
NOT USED
To PREAMPLIFIER BOARD ·······CN1
D
C
B
A
1
2
3
4
5
6

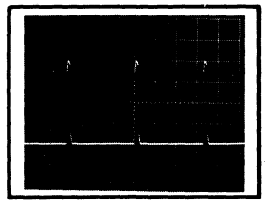
IC1	CX20180	D3
IC4	MN74HC4049S	C2
IC5	CX23047B	D5
IC7	MN74HC367S	B2
IC8	MN74HC4050S	B2
IC11	MN74HC4050S	C4
IC12	MN74HC4050S	B3
Q2	2SD602-QRS	C3
Q4	2SD973A-RS	A5
Q5	2SB710-Q	C6
Q6	2SC2404-CDTW	B2
Q7	2SC2404-CDTW	B2
Q8	2SC2404-CDTW	B3
D1	MA151WA	D2
D2	MA151WA	D2
D3	MA151WA	D2
D4	MA151A	B3
D5	MA151A	B3
D6	MA4051M	D2
D7	MA153	D2
D8	MA151A	C4

CONDUCTOR VIEW OF CCD DRIVE BOARD

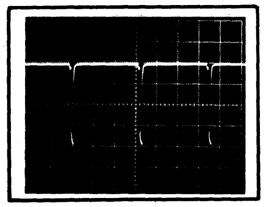
1. 2V/DIV, 20μs/DIV



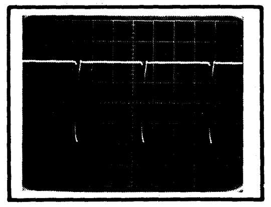
2. 2V/DIV, 20μs/DIV



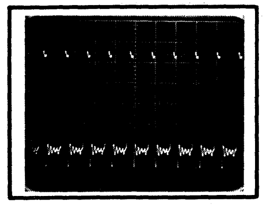
3. 2V/DIV, 20μs/DIV



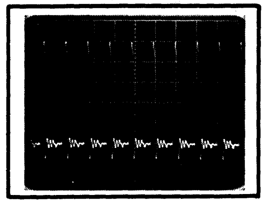
4. 2V/DIV, 20μs/DIV



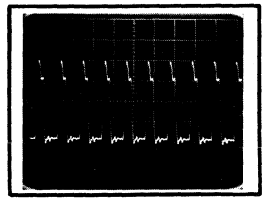
5. 1V/DIV, 0.1μs/DIV



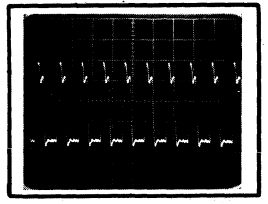
6. 1V/DIV, 0.1μs/DIV



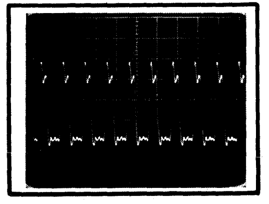
7. 0.5V/DIV, 0.1μs/DIV



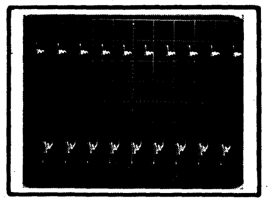
8. 0.5V/DIV, 0.1μs/DIV



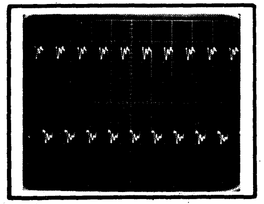
9. 0.5V/DIV, 0.1μs/DIV



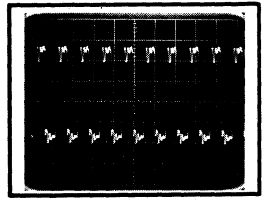
10. 1V/DIV, 0.1μs/DIV



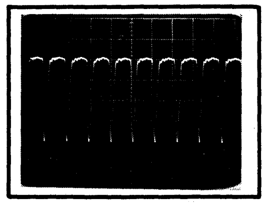
11. 1V/DIV, 0.1μs/DIV



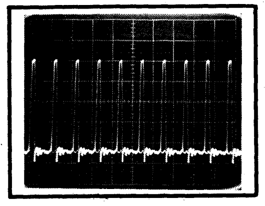
12. 1V/DIV, 0.1μs/DIV



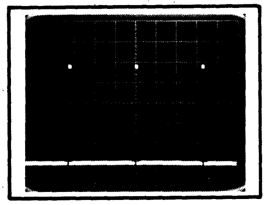
13. 1V/DIV, 0.1μs/DIV



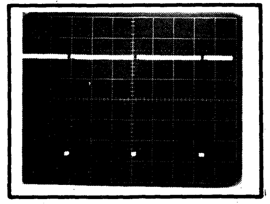
14. 1V/DIV, 0.1μs/DIV



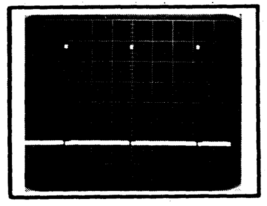
15. 1V/DIV, 20μs/DIV



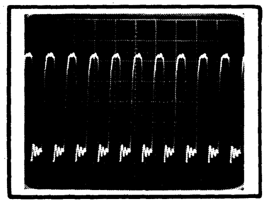
16. 1V/DIV, 20μs/DIV



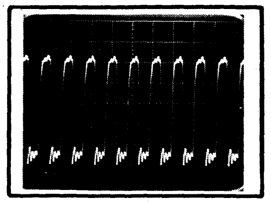
17. 1V/DIV, 20μs/DIV



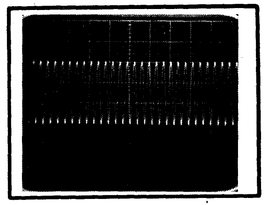
18. 1V/DIV, 0.1μs/DIV



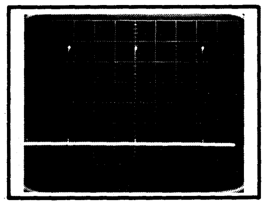
19. 1V/DIV, 0.1μs/DIV



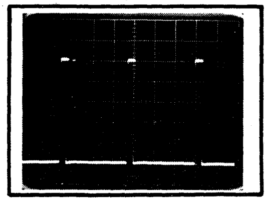
20. 0.5V/DIV, 0.1μs/DIV



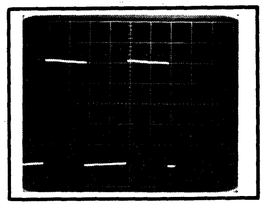
21. 1V/DIV, 20μs/DIV



22. 1V/DIV, 20μs/DIV



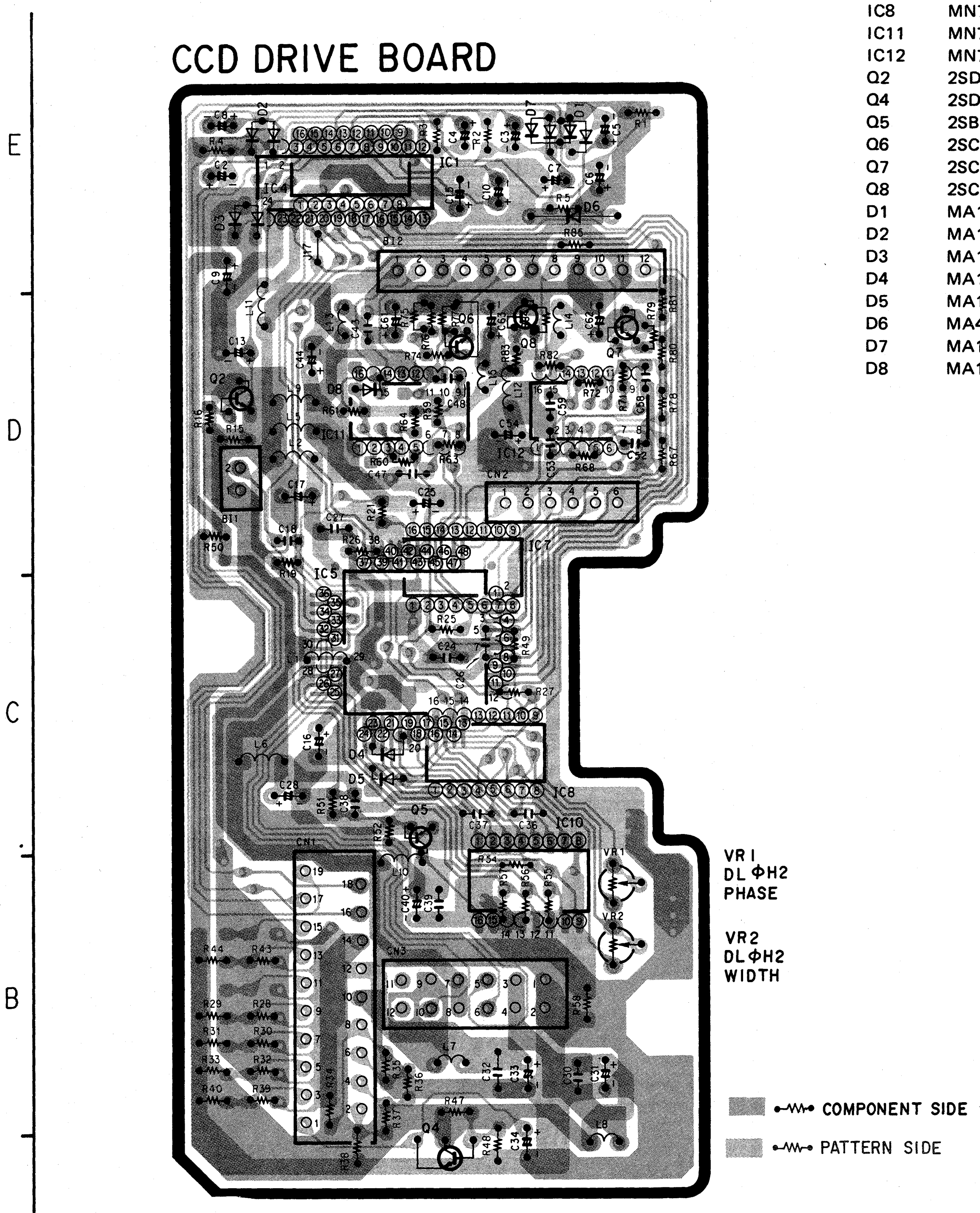
23. 1V/DIV, 10μs/DIV



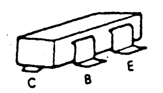
	IC1	IC4	IC7	IC8	IC11	IC12	IC5		IC5
Pin 1	0	4.9	0	4.7	4.7	0	-4.9	Pin 25	0
2	0	4.2	4.0	0	1.7	-10.1	-5.2	26	0
3	0.5	0.5	4.4	0	-0.2	1.4	-2.4	27	0
4	0	---	3.5	1.8	-10.2	-6.6	4.5	28	4.7
5	8.2	0	7.3	2.3	1.3	1.4	0.2	29	0
6	7.9	----	1.9	6.6	-10.4	-6.3	0	30	8.9
7	0.5	0	2.2	3.4	-5.1	-4.7	0	31	0
8	8.2	0	0	0	0	0	4.5	32	8.5
9	8.2	0	2.2	0.1	0	-5.0	0.2	33	1.6
10	7.9	----	1.9	2.0	-15.4	-6.4	4.7	34	2.5
11	0	0	1.8	0.1	0	0	0	35	4.3
12	0	----	1.2	1.2	-15.6	-6.8	3.6	36	-6.9
13	14.0	----	1.8	0	0	-	0.2	37	4.5
14	4.7	0	1.2	-0.2	0	1.3	-0.2	38	4.0
15	4.7	----	0	1.4	0	-10.3	2.6	39	0
16	0	----	4.7	0	0	0	2.4	40	0.2
17	0.2						0.1	41	0.1
18	4.4						2.1	42	0.1
19	0.2						4.8	43	4.7
20	0						0.5	44	0
21	4.5						2.3	45	0
22	4.5						0	46	4.7
23	4.5						0	47	0
24	14.0						0	48	0

	Q2	Q4	Q5	Q6	Q7	Q8
B	14.6	6.1	4.7	3.0	3.1	3.1
C	20.0	8.8	0.1	4.7	4.7	4.7
E	14.0	5.4	4.7	2.4	2.4	2.4

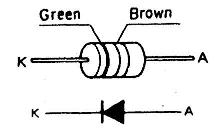
IC1	CX20180	E2
IC4	MN74HC4049S	E2
IC5	CX23047B	C2
IC7	MN74HC367S	D2
IC8	MN74HC4050S	C2
IC11	MN74HC4050S	D2
IC12	MN74HC4050S	D2
Q2	2SD602-QRS	D1
Q4	2SD973A-RS	A2
Q5	2SB710-Q	C2
Q6	2SC2404-CDTW	D2
Q7	2SC2404-CDTW	D3
Q8	2SC2404-CDTW	D2
D1	MA151WA	E2
D2	MA151WA	E1
D3	MA151WA	E1
D4	MA151A	C2
D5	MA151A	C2
D6	MA4051M	E2
D7	MA153	E2
D8	MA151A	D2


CCD DRIVE BOARD
E
D
C
B
IC1
IC5
IC7
IC8
IC10
IC11
IC12
CN1
CN2
CN3
Q2
Q4
Q5
Q6
Q7
Q8
VR1
DL ΦH2
PHASE
VR2
DL ΦH2
WIDTH
▨ -W- COMPONENT SIDE
▨ -W- PATTERN SIDE

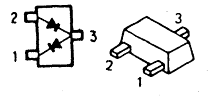
2SC2404-CDTW
2SD602-QRS
2SD973A-RS
2SB710-Q



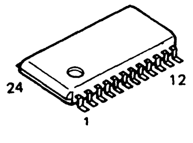
MA4051M


Green
Brown
K
A
K
A

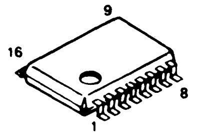
MA153



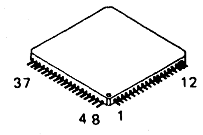
CX20180



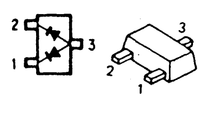
MN74HC4050S
MN74HC4049S
MN74HC367S



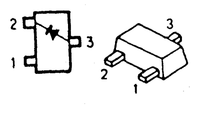
CX23047B



MA151WA



MA151A

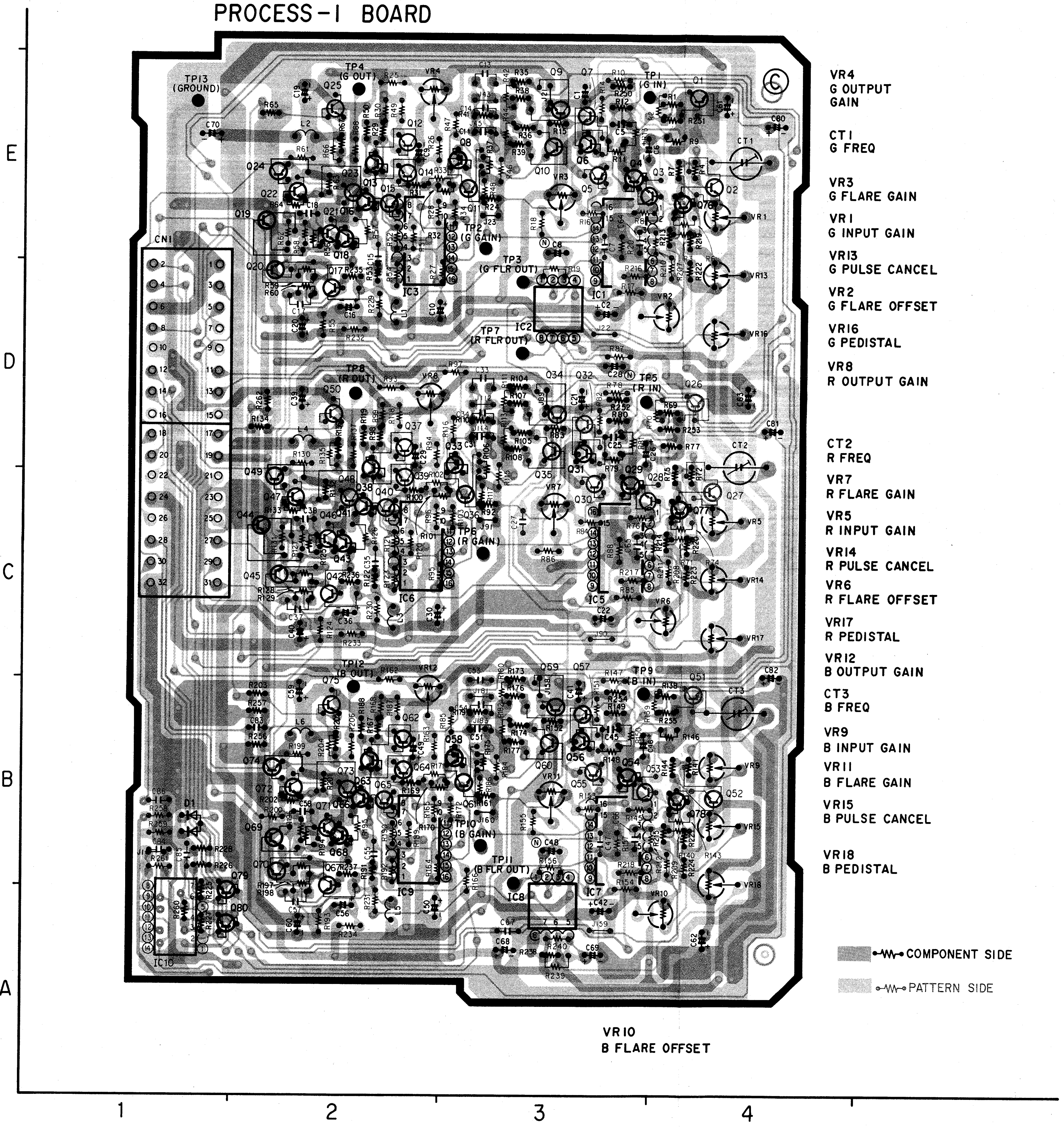


A

1 2 3

CONDUCTOR VIEW OF PROCESS-1 BOARD

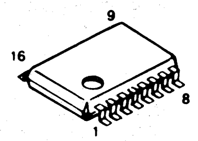
IC1	MN4053BS	E3
IC2	NJM4558M	D3
IC3	AN90B01S	E2
IC5	MN4053BS	C3
IC6	AN90B01S	C2
IC7	MN4053BS	B3
IC8	NJM4558M	A3
IC9	AN90B01S	B2
IC10	MN4093BS	A1
Q1	2SC2404-CDTW	E4
Q2	2SC2404-CDTW	E4
Q3	2SD601-RS	E3
Q4	2SC2404-CDTW	E3
Q5	2SA1034-ST	E3
Q6	2SB709-Q	E3
Q7	2SD601-RS	E3
Q8	2SC2404-CDTW	E3
Q9	2SC2405-RSTW	E3
Q10	2SC2405-RSTW	E3
Q11	2SC2404-CDTW	E3
Q12	2SA1022-C	E2
Q13	2SA1022-C	E2
Q14	2SC2404-CDTW	E2
Q15	2SC2404-CDTW	E2
Q16	2SD601-RS	E2
Q17	2SC2404-CDTW	D2
Q18	2SD601-QR	E2
Q19	2SD601-RS	E2
Q20	2SC2404-CDTW	D2
Q21	2SC2404-CDTW	E2
Q22	2SC2404-CDTW	E2
Q23	2SA1022-C	E2
Q24	2SB709-Q	E2
Q25	2SD601-RS	E2
Q26	2SC2404-CDTW	D4
Q27	2SC2404-CDTW	C4
Q28	2SD601-RS	C3
Q29	2SC2404-CDTW	C3
Q30	2SA1034-QR	C3
Q31	2SB709-Q	D3
Q32	2SD601-RS	D3
Q33	2SC2404-CDTW	D3
Q34	2SC2405-RSTW	D3
D35	2SC2405-RSTW	D3
Q36	2SC2404-CDTW	C3
Q37	2SA1022-C	D2
Q38	2SA1022-C	D2
Q39	2SC2404-CDTW	C2
Q40	2SC2404-CDTW	C2
Q41	2SD601-RS	C2
Q42	2SC2404-CDTW	C2
Q43	2SD601-RS	C2
Q44	2SB709-Q	C2
Q45	2SC2404-CDTW	C2
Q46	2SC2404-CDTW	C2
Q47	2SC2404-CDTW	C2
Q48	2SA1022-C	C2
Q49	2SB709-Q	C2
Q50	2SD601-RS	D2
Q51	2SC2404-CDTW	B4
Q52	2SC2404-CDTW	B4
Q53	2SD601-RS	B3
Q54	2SC2404-CDTW	B3
Q55	2SA1034-ST	B3
Q56	2SB709-Q	B3
Q57	2SD601-RS	B3
Q58	2SC2404-CDTW	B3
Q59	2SC2405-RSTW	B3
Q60	2SC2405-RSTW	B3
Q61	2SC2404-CDTW	B3
Q62	2SA1022-C	B2
Q63	2SA1022-C	B2
Q64	2SC2404-CDTW	B2
Q65	2SC2404-CDTW	B2
Q66	2SD601-RS	B2
Q67	2SC2404-CDTW	B2
Q68	2SD601-RS	B2
Q69	2SB709-Q	B2
Q70	2SC2404-CDTW	B2
Q71	2SC2404-CDTW	B2
Q72	2SC2404-CDTW	B2
Q73	2SA1022-C	B2
Q74	2SB709-Q	B2
Q75	2SD601-RS	B2
Q76	2SB709-Q	E4
Q77	2SB709-Q	C4
Q78	2SB709-Q	B4
Q79	2SB709-Q	A1
Q80	2SB709-Q	A1
D1	MA151WA	B1


PROCESS-1 BOARD
E
D
C
B
A
1
2
3
4
TP13 (GROUND)
TP4 (G OUT)
TP1 (G IN)
TP2 (G GAIN)
TP3 (G FLR OUT)
TP7 (R FLR OUT)
TP8 (R OUT)
TP5 (R IN)
TP6 (R GAIN)
TP12 (B OUT)
TP9 (B IN)
TP10 (B GAIN)
TP11 (B FLR OUT)
CN1
CT1
CT2
CT3
IC1
IC2
IC3
IC5
IC6
IC7
IC8
IC9
IC10
VR4
G OUTPUT GAIN
CT1
G FREQ
VR3
G FLARE GAIN
VR1
G INPUT GAIN
VR13
G PULSE CANCEL
VR2
G FLARE OFFSET
VR16
G PEDISTAL
VR8
R OUTPUT GAIN
CT2
R FREQ
VR7
R FLARE GAIN
VR5
R INPUT GAIN
VR14
R PULSE CANCEL
VR6
R FLARE OFFSET
VR17
R PEDISTAL
VR12
B OUTPUT GAIN
CT3
B FREQ
VR9
B INPUT GAIN
VR11
B FLARE GAIN
VR15
B PULSE CANCEL
VR18
B PEDISTAL
VR10
B FLARE OFFSET
COMPONENT SIDE
PATTERN SIDE

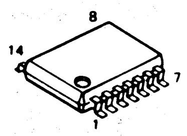
Pin No.	IC1	IC2	IC3	IC5	IC6	IC7	IC8	IC9	IC10
1	0	—	—	0	—	0	—	—	2.3
2	0	—	6.2	0	6.2	0	—	6.2	2.3
3	2.3	—	1.6	2.2	1.6	2.1	—	1.6	8.6
4	2.3	8.8	2.3	2.3	2.3	2.3	−4.4	2.3	8.7
5	2.3	—	0	2.3	0	2.3	2.3	0	2.3
6	0	—	6.2	0	6.2	0	2.3	6.2	8.6
7	−4.4	0	1.6	−4.4	1.6	−4.4	2.1	1.6	0
8	0	8.8	2.3	0	2.3	0	8.8	2.3	2.3
9	2.4		6.2	2.4	6.2	2.4		6.2	8.7
10	0.6		1.6	0.6	1.6	0.6		1.6	8.7
11	0.6		2.3	0.6	2.3	0.6		2.3	0
12	0		2.3	0	2.3	0		2.3	8.7
13	0		1.6	0	1.6	0		1.6	8.7
14	0		6.2	0	6.2	0		6.2	8.8
15	0			0		0			
16	8.8			8.8					

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
B	0.5	0.5	5.9	0	0	1.5	0.7	0	−4.3	−4.3
C	8.8	5.9	8.8	0.1	−4.4	−4.4	8.8	1.5	−0.7	−0.7
E	−0.2	−0.2	5.2	0	0.7	0.7	0	−0.6	−0.6	−0.6
	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
B	0	6.2	6.2	−1.9	−1.9	0.2	0.3	2.4	1.9	0.1
C	1.6	−1.9	0.2	−1.9	0.2	8.7	2.4	8.8	0	1.8
E	−0.7	6.9	6.9	−2.6	−2.6	−0.4	2.3	1.8	1.8	0
	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30
B	1.9	2.3	8.6	1.7	2.4	0.4	0.5	5.7	0	0
C	8.8	8.6	1.7	0	8.8	8.8	5.8	8.8	0.1	−4.4
E	1.7	1.7	8.8	2.3	1.7	−0.3	−0.2	5.1	0	0.7
	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40
B	1.5	0.7	0	−4.3	−4.3	0	6.2	6.2	−1.9	−1.9
C	−4.4	8.8	1.6	−0.7	−0.7	1.6	−1.9	0.2	−1.9	0.3
E	0.7	0	−0.6	−0.6	−0.6	−0.7	7	6.9	−2.7	−2,6
	Q41	Q42	Q43	Q44	Q45	Q46	Q47	Q48	Q49	Q50
B	0.2	0.3	2.4	1.8	0.2	1.9	2.3	8.6	1.7	2.3
C	8.8	2.4	8.8	0	1.9	8.8	8.6	1.7	0	8.8
E	−0.3	2.3	1.8	1.9	0	1.7	1.7	8.8	2.3	1.7
	Q51	Q52	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q60
B	0.4	0.5	3.6	0	0	1.5	0.7	0	−4.3	−4.3
C	8.8	3.6	8.8	0.1	−4.4	−4.4	8.8	1.6	−0.7	−0.7
E	−0.3	−0.2	3.0	0	0.7	0.7	0.1	−0.6	−0.6	−0.6
	Q61	Q62	Q63	Q64	Q65	Q66	Q67	Q68	Q69	Q70
B	0	6.3	6.2	−1.9	−1.9	0.2	0.3	2.4	1.8	0.2
C	1.6	−1.9	0.2	−1.9	0.3	8.8	2.5	8.8	0	1.9
E	−0.7	7	6.9	−2.6	−2.6	−0.3	2.4	1.8	1.9	0
	Q71	Q72	Q73	Q74	Q75	Q76	Q77	Q78	Q79	Q80
B	1.9	1.7	8.6	1.7	1.8	2.3	2.3	2.3	8.7	8.7
C	8.8	8.6	1.7	0	8.8	0	0	0	−4.3	−4.3
E	1.7	2.3	8.8	2.4	2.4	2.9	2.9	2.9	8.8	8.8

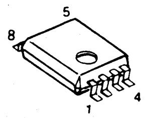
MN4053BS
AN90B01S



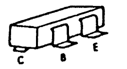
MN4093BS



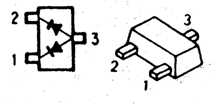
NJM4558M



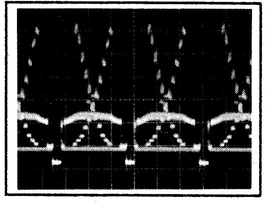
2SC2405-RSTW
2SC2404-CDTW
2SD601-RS
2SA1034-ST
2SB709-Q
2SA1022-C

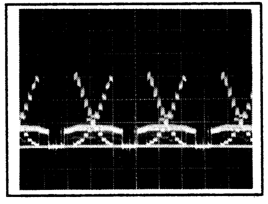


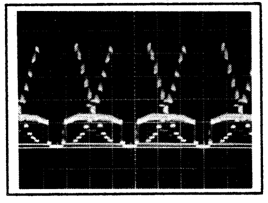
MA151WA

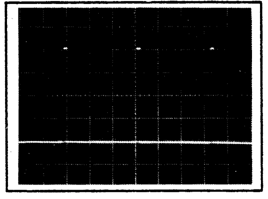


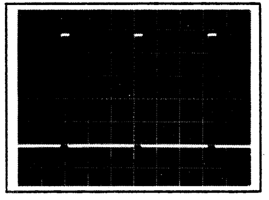
SCHEMATIC DIAGRAM OF

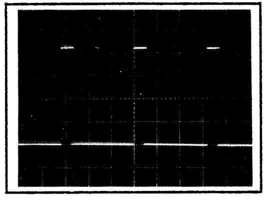

1. 0.1V/DIV , 20µs/DIV

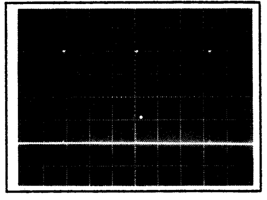

2. 0.2V/DIV , 20µs/DIV

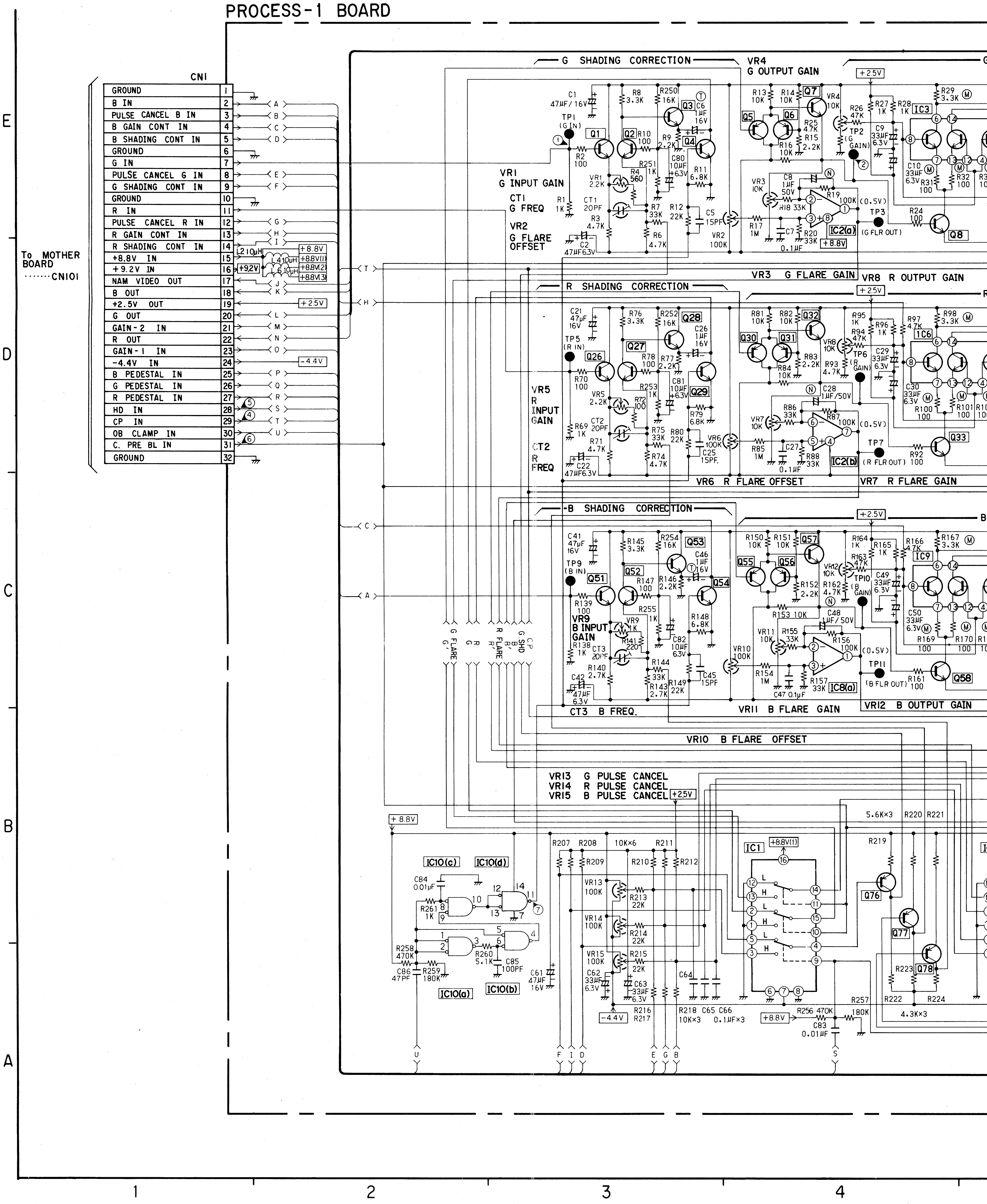

3. 0.2V/DIV , 20µs/DIV


4. 2V/DIV , 20µs/DIV

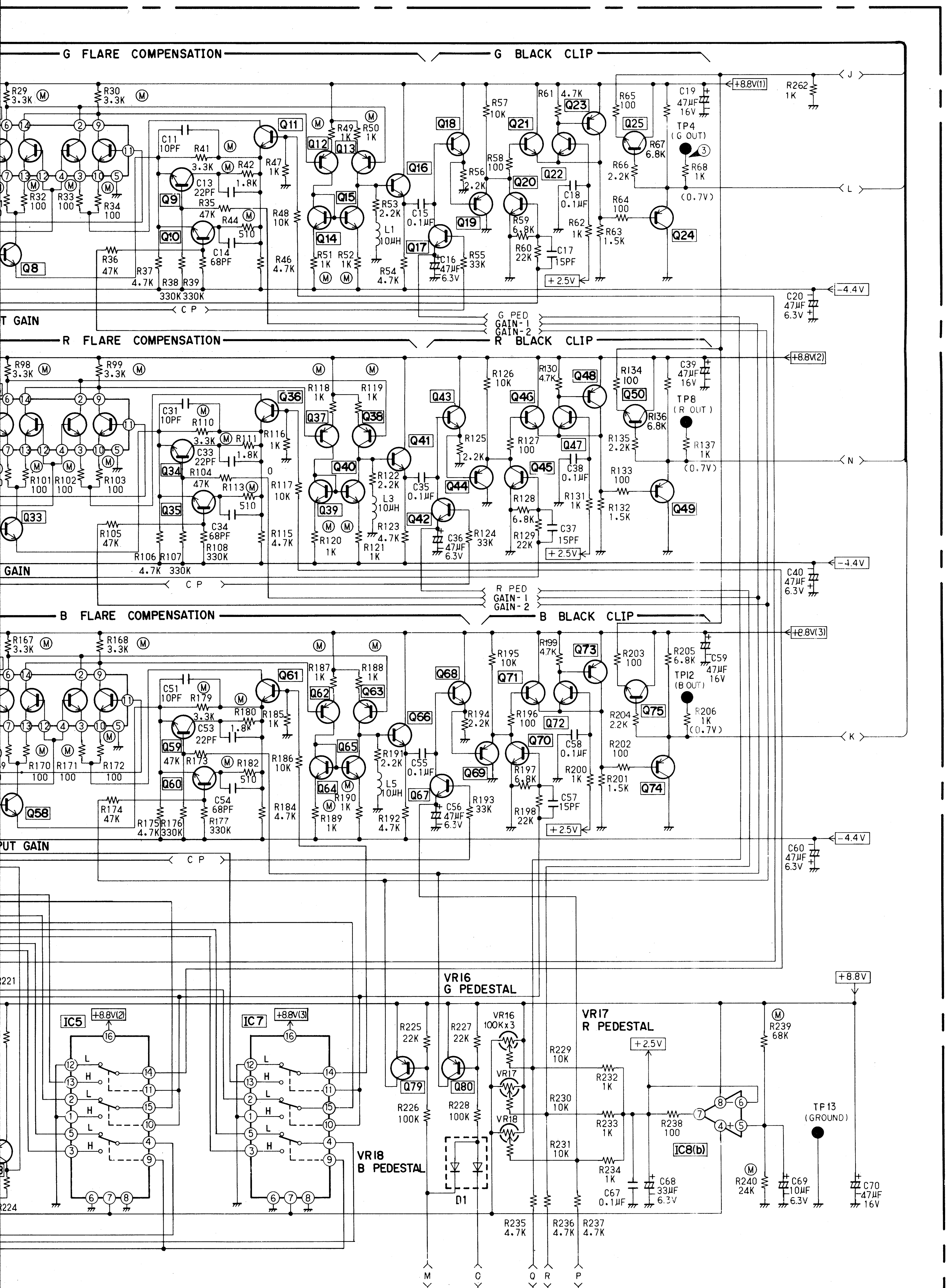

5. 1V/DIV , 20µs/DIV


6. 2V/DIV , 20µs/DIV


7. 2V/DIV , 20µs/DIV


PROCESS-1 BOARD
CN1
1 GROUND
2 B IN
3 PULSE CANCEL B IN
4 B GAIN CONT IN
5 B SHADING CONT IN
6 GROUND
7 G IN
8 PULSE CANCEL G IN
9 G SHADING CONT IN
10 GROUND
11 R IN
12 PULSE CANCEL R IN
13 R GAIN CONT IN
14 R SHADING CONT IN
15 +8.8V IN
16 +9.2V IN
17 NAM VIDEO OUT
18 B OUT
19 +2.5V OUT
20 G OUT
21 GAIN-2 IN
22 R OUT
23 GAIN-1 IN
24 -4.4V IN
25 B PEDESTAL IN
26 G PEDESTAL IN
27 R PEDESTAL IN
28 HD IN
29 CP IN
30 OB CLAMP IN
31 C. PRE BL IN
32 GROUND
To MOTHER BOARD ·······CN101
G SHADING CORRECTION
VR4 G OUTPUT GAIN
VR1 G INPUT GAIN
CT1 G FREQ
VR2 G FLARE OFFSET
VR3 G FLARE GAIN
TP1 (G IN)
TP2 (G GAIN)
TP3 (G FLR OUT)
IC2(a)
IC3
Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8
R SHADING CORRECTION
VR8 R OUTPUT GAIN
VR5 R INPUT GAIN
CT2 R FREQ
VR6 R FLARE OFFSET
VR7 R FLARE GAIN
TP5 (R IN)
TP6 (R GAIN)
TP7 (R FLR OUT)
IC2(b)
IC6
Q26 Q27 Q28 Q29 Q30 Q31 Q32 Q33
B SHADING CORRECTION
VR9 B INPUT GAIN
CT3 B FREQ.
VR10 B FLARE OFFSET
VR11 B FLARE GAIN
VR12 B OUTPUT GAIN
TP9 (B IN)
TP10 (B GAIN)
TP11 (B FLR OUT)
IC8(a)
IC9
Q51 Q52 Q53 Q54 Q55 Q56 Q57 Q58
VR13 G PULSE CANCEL
VR14 R PULSE CANCEL
VR15 B PULSE CANCEL
+2.5V
+8.8V
-4.4V
IC1
IC10(a) IC10(b) IC10(c) IC10(d)
Q76 Q77 Q78
G FLARE G'
R G
R FLARE R'
G SHD B'
CP
5.6K×3
4.3K×3
10K×6
R218 C65 C66 10K×3 0.1µF×3
(0.5V)
E
D
C
B
A
1
2
3
4

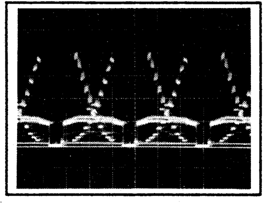
OF PROCESS-1 BOARD


G FLARE COMPENSATION
G BLACK CLIP
R FLARE COMPENSATION
R BLACK CLIP
B FLARE COMPENSATION
B BLACK CLIP
T GAIN
GAIN
PUT GAIN
C P
G PED
GAIN-1
GAIN-2
R PED
GAIN-1
GAIN-2
+8.8V(1)
+8.8V(2)
+8.8V(3)
+8.8V
-4.4V
+2.5V
TP4
(G OUT)
TP8
(R OUT)
TP12
(B OUT)
TP13
(GROUND)
(0.7V)
J
L
N
K
M
C
Q
R
P
VR16
G PEDESTAL
VR17
R PEDESTAL
VR18
B PEDESTAL
IC5
IC7
IC8(b)
D1
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
Q17
Q18
Q19
Q20
Q21
Q22
Q23
Q24
Q25
Q33
Q34
Q35
Q36
Q37
Q38
Q39
Q40
Q41
Q42
Q43
Q44
Q45
Q46
Q47
Q48
Q49
Q50
Q58
Q59
Q60
Q61
Q62
Q63
Q64
Q65
Q66
Q67
Q68
Q69
Q70
Q71
Q72
Q73
Q74
Q75
Q79
Q80
5
6
7

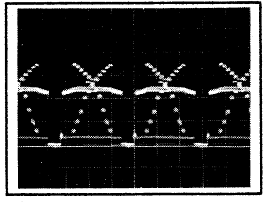
IC1	MN4053BS	B4
IC2	NJM4558M	B5
IC3	AN90B01S	E5
IC5	MN4053BS	B5
IC6	AN90B01S	D5
IC7	MN4053BS	B5
IC8	NJM4558M	C4
IC9	AN90B01S	C5
IC10	MN4093BS	A2
Q1	2SC2404-CDTW	E3
Q2	2SC2404-CDTW	E3
Q3	2SD601-QR	E3
Q4	2SC2404-CDTW	E3
Q5	2SA1034-ST	E4
Q6	2SB709-Q	E4
Q7	2SD601-QR	E4
Q8	2SC2404-CDTW	E4
Q9	2SC2405-RSTW	E5
Q10	2SC2405-RSTW	E5
Q11	2SC2404-CDTW	E5
Q12	2SA1022-C	E6
Q13	2SA1022-C	E6
Q14	2SC2404-CDTW	E6
Q15	2SC2404-CDTW	E6
Q16	2SD601-QR	E6
Q17	2SC2404-CDTW	E6
Q18	2SD601-QR	E6
Q19	2SB709-Q	E6
Q20	2SC2404-CDTW	E6
Q21	2SC2404-CDTW	E6
Q22	2SC2404-CDTW	E6
Q23	2SA1022-C	E6
Q24	2SB709-Q	E7
Q25	2SD601-QR	E7
Q26	2SC2404-CDTW	D3
Q27	2SC2404-CDTW	D3
Q28	2SD601-QR	D3
Q29	2SC2404-CDTW	D3
Q30	2SA1034-QR	D4
Q31	2SB709-Q	D4
Q32	2SD601-QR	D4
Q33	2SC2404-CDTW	D4
Q34	2SC2405-RSTW	D5
D35	2SC2405-RSTW	D5
Q36	2SC2404-CDTW	D5
Q37	2SA1022-C	D6
Q38	2SA1022-C	D6
Q39	2SC2404-CDTW	D6
Q40	2SC2404-CDTW	D6
Q41	2SD601-QR	D6
Q42	2SC2404-CDTW	D6
Q43	2SD601-QR	D6
Q44	2SB709-Q	D6
Q45	2SC2404-CDTW	D6
Q46	2SC2404-CDTW	D6
Q47	2SC2404-CDTW	D6
Q48	2SA1022-C	D6
Q49	2SB709-Q	D7
Q50	2SD601-QR	D7
Q51	2SC2404-CDTW	C3
Q52	2SC2404-CDTW	C3
Q53	2SD601-QR	C3
Q54	2SC2404-CDTW	C3
Q55	2SA1034-ST	C4
Q56	2SB709-Q	C4
Q57	2SD601-QR	C4
Q58	2SC2404-CDTW	C4
Q59	2SC2405-RSTW	C5
Q60	2SC2405-RSTW	C5
Q61	2SC2404-CDTW	C5
Q62	2SA1022-C	C6
Q63	2SA1022-C	C6
Q64	2SC2404-CDTW	C6
Q65	2SC2404-CDTW	C6
Q66	2SD601-QR	C6
Q67	2SC2404-CDTW	C6
Q68	2SD601-QR	C6
Q69	2SB709-Q	C6
Q70	2SC2404-CDTW	C6
Q71	2SC2404-CDTW	C6
Q72	2SC2404-CDTW	C6
Q73	2SA1022-C	C6
Q74	2SB709-Q	C7
Q75	2SD601-QR	C7
Q76	2SB709-Q	B4
Q77	2SB709-Q	B4
Q78	2SB709-Q	A4
Q79	2SB709-Q	B6
Q80	2SB709-Q	B6
D1	MA151WA	A6

SCHEMATIC DIAGRAM

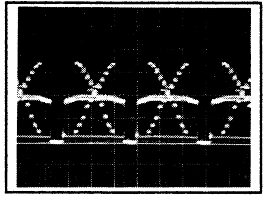
1. 0.2V/DIV , 20µs/DIV



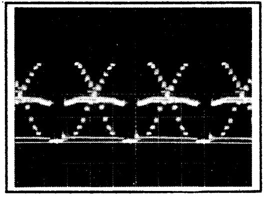
2. 0.2V/DIV , 20µs/DIV



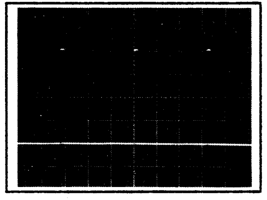
3. 0.2V/DIV , 20µs/DIV



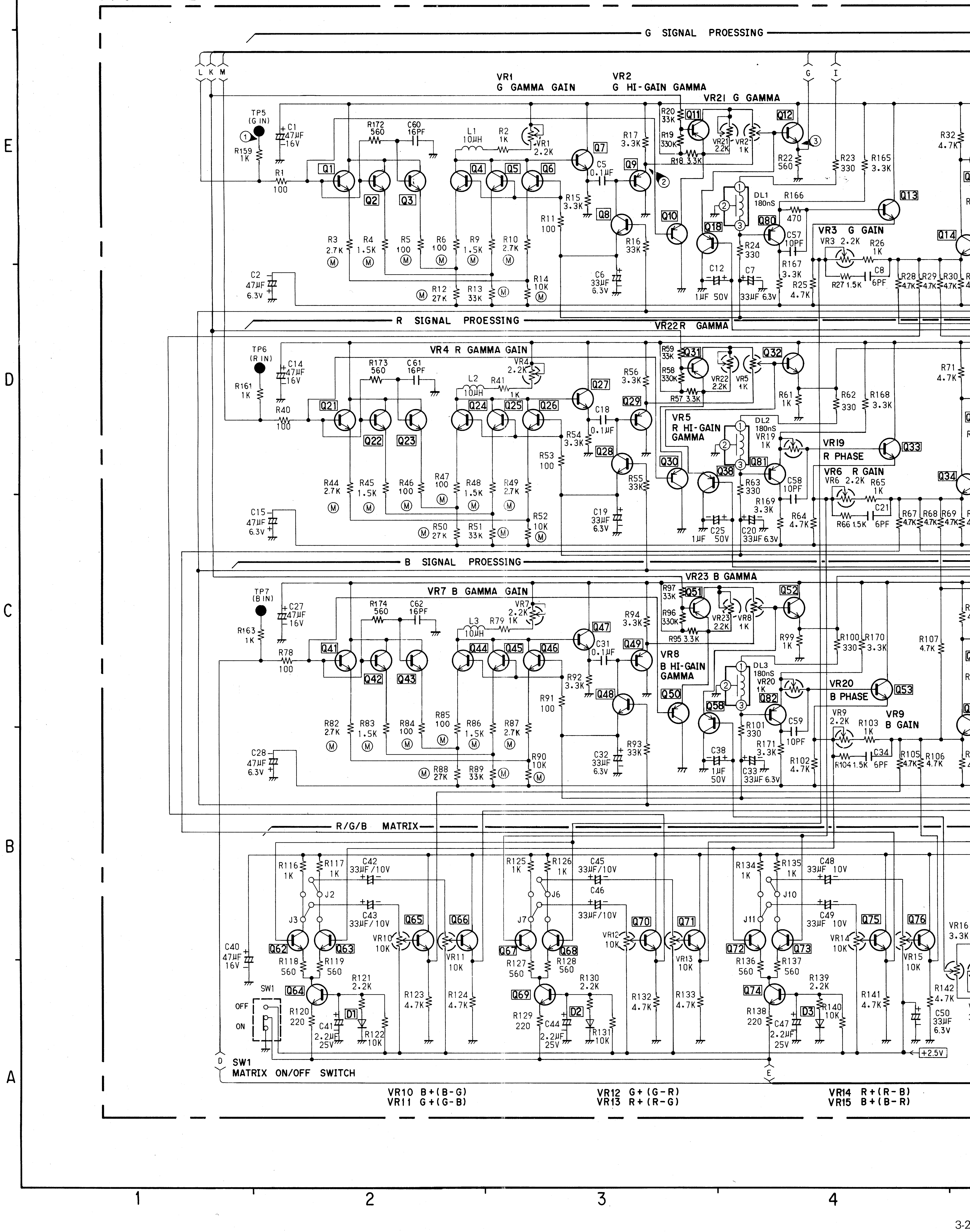
4. 0.2V/DIV , 20µs/DIV



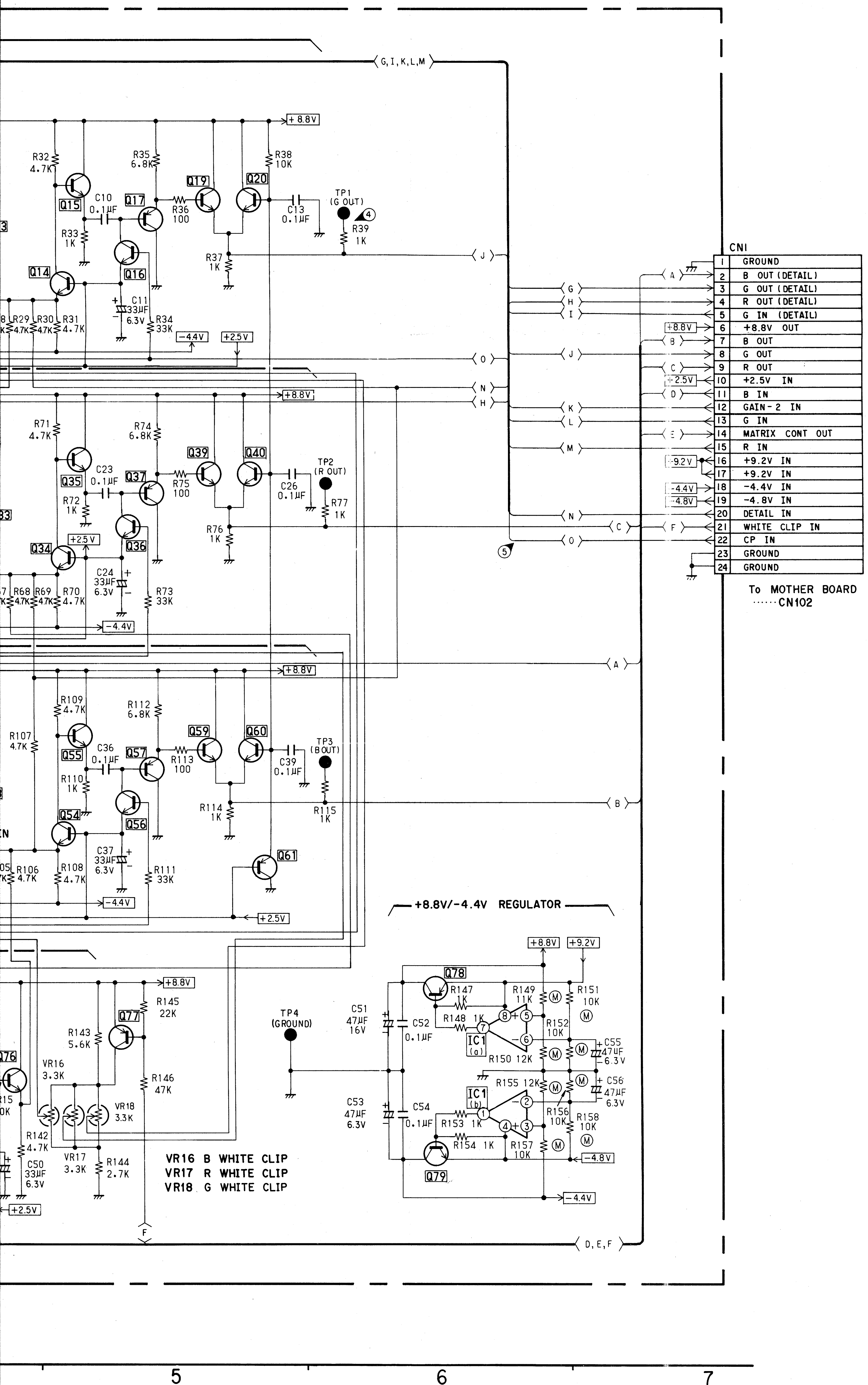
5. 2V/DIV , 20µs/DIV



PROCESS-2 BOARD


G SIGNAL PROESSING
L
K
M
G
I
VR1 G GAMMA GAIN
VR2 G HI-GAIN GAMMA
VR21 G GAMMA
TP5 (G IN)
C1 47µF 16V
R159 1K
R1 100
R172 560
C60 16PF
L1 10µH
R2 1K
VR1 2.2K
R17 3.3K
R20 33K
R19 330K
R18 3.3K
VR21 2.2K
VR2 1K
R22 560
R23 330
R165 3.3K
R32 4.7K
C5 0.1µF
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q18
Q80
R15 3.3K
R11 100
R16 33K
R3 2.7K
R4 1.5K
R5 100
R6 100
R9 1.5K
R10 2.7K
R12 27K
R13 33K
R14 10K
C2 47µF 6.3V
C6 33µF 6.3V
DL1 180nS
R166 470
C57 10PF
R24 330
C12 1µF 50V
C7 33µF 6.3V
R167 3.3K
R25 4.7K
VR3 G GAIN
VR3 2.2K
R26 1K
R27 1.5K
C8 6PF
R28 4.7K
R29 4.7K
R30 4.7K
R SIGNAL PROESSING
VR22 R GAMMA
VR4 R GAMMA GAIN
TP6 (R IN)
C14 47µF 16V
R161 1K
R40 100
R173 560
C61 16PF
L2 10µH
R41 1K
VR4 2.2K
R56 3.3K
R59 33K
R58 330K
R57 3.3K
VR22 2.2K
VR5 1K
R61 1K
R62 330
R168 3.3K
R71 4.7K
C18 0.1µF
Q21
Q22
Q23
Q24
Q25
Q26
Q27
Q28
Q29
Q30
Q31
Q32
Q33
Q34
Q38
Q81
R54 3.3K
R53 100
R55 33K
VR5 R HI-GAIN GAMMA
DL2 180nS
VR19 1K
VR19 R PHASE
VR6 R GAIN
VR6 2.2K
R65 1K
R63 330
C58 10PF
R169 3.3K
R64 4.7K
C25 1µF 50V
C20 33µF 6.3V
C21 6PF
R66 1.5K
R67 4.7K
R68 4.7K
R69 4.7K
R44 2.7K
R45 1.5K
R46 100
R47 100
R48 1.5K
R49 2.7K
R50 27K
R51 33K
R52 10K
C15 47µF 6.3V
C19 33µF 6.3V
B SIGNAL PROESSING
VR23 B GAMMA
VR7 B GAMMA GAIN
TP7 (B IN)
C27 47µF 16V
R163 1K
R78 100
R174 560
C62 16PF
L3 10µH
R79 1K
VR7 2.2K
R94 3.3K
R97 33K
R96 330K
R95 3.3K
VR23 2.2K
VR8 1K
R99 1K
R100 330
R170 3.3K
R107 4.7K
C31 0.1µF
Q41
Q42
Q43
Q44
Q45
Q46
Q47
Q48
Q49
Q50
Q51
Q52
Q53
Q58
Q82
R92 3.3K
R91 100
R93 33K
VR8 B HI-GAIN GAMMA
DL3 180nS
VR20 1K
VR20 B PHASE
VR9 2.2K
R103 1K
VR9 B GAIN
R101 330
C59 10PF
R171 3.3K
R102 4.7K
C38 1µF 50V
C33 33µF 6.3V
C34 6PF
R104 1.5K
R105 4.7K
R106 4.7K
R82 2.7K
R83 1.5K
R84 100
R85 100
R86 1.5K
R87 2.7K
R88 27K
R89 33K
R90 10K
C28 47µF 6.3V
C32 33µF 6.3V
R/G/B MATRIX
R116 1K
R117 1K
C42 33µF/10V
J2
J3
C43 33µF/10V
Q62
Q63
Q64
Q65
Q66
VR10 10K
VR11 10K
R118 560
R119 560
R121 2.2K
R120 220
C41 2.2µF 25V
D1
R122 10K
R123 4.7K
R124 4.7K
C40 47µF 16V
SW1
OFF
ON
R125 1K
R126 1K
C45 33µF/10V
C46 33µF/10V
J6
J7
Q67
Q68
Q69
Q70
Q71
VR12 10K
VR13 10K
R127 560
R128 560
R130 2.2K
R129 220
C44 2.2µF 25V
D2
R131 10K
R132 4.7K
R133 4.7K
R134 1K
R135 1K
C48 33µF 10V
C49 33µF 10V
J10
J11
Q72
Q73
Q74
Q75
Q76
VR14 10K
VR15 10K
VR16 3.3K
R136 560
R137 560
R139 2.2K
R138 220
C47 2.2µF 25V
D3
R140 10K
R141 4.7K
R142 4.7K
C50 33µF 6.3V
+2.5V
D
E
SW1 MATRIX ON/OFF SWITCH
VR10 B+(B-G)
VR11 G+(G-B)
VR12 G+(G-R)
VR13 R+(R-G)
VR14 R+(R-B)
VR15 B+(B-R)
E
D
C
B
A
1
2
3
4
①
②
③

AM OF PROCESS-2 BOARD

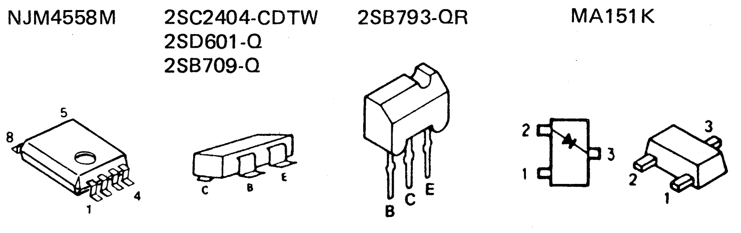


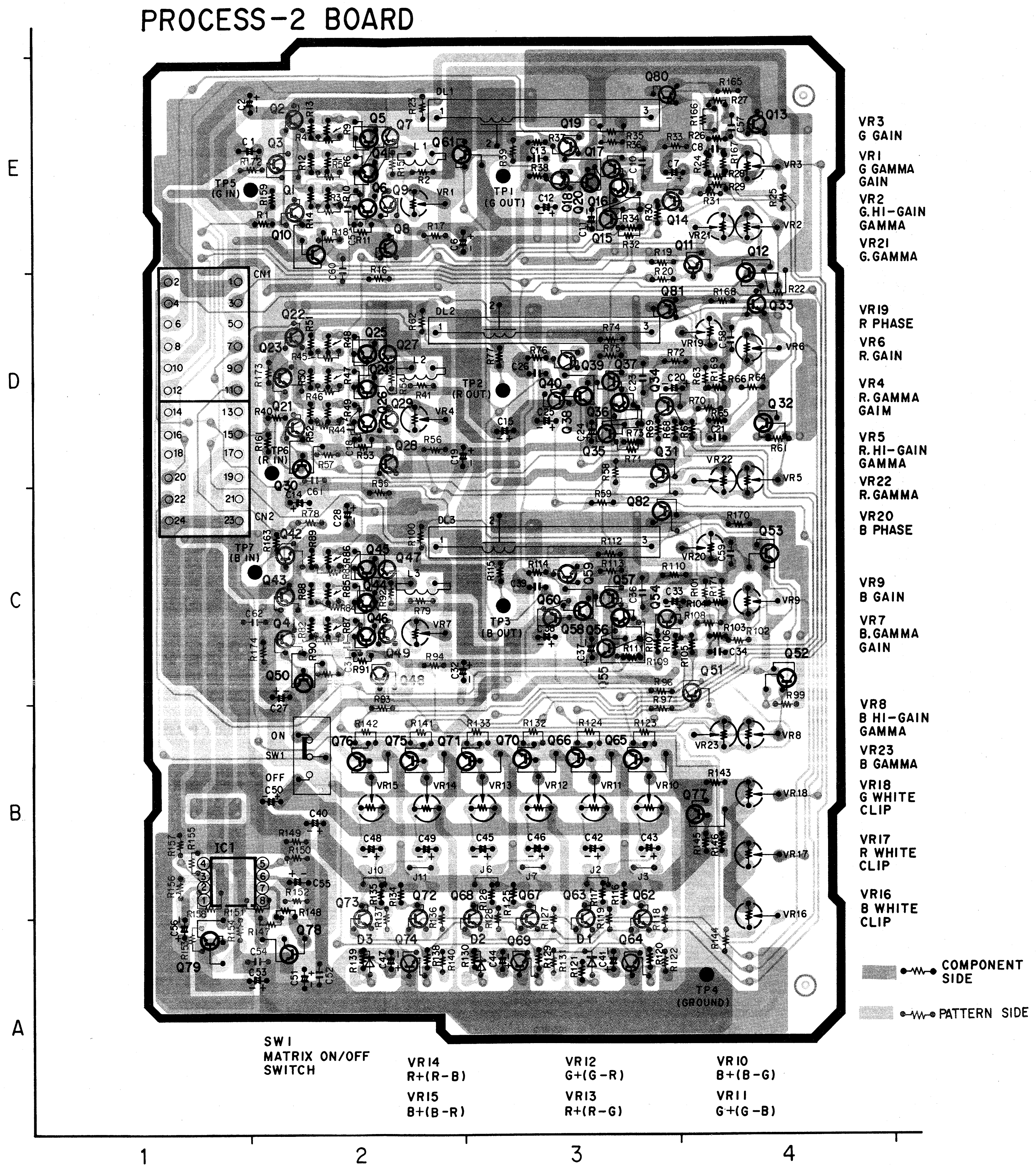
CN1
1 GROUND
2 B OUT (DETAIL)
3 G OUT (DETAIL)
4 R OUT (DETAIL)
5 G IN (DETAIL)
6 +8.8V OUT
7 B OUT
8 G OUT
9 R OUT
10 +2.5V IN
11 B IN
12 GAIN-2 IN
13 G IN
14 MATRIX CONT OUT
15 R IN
16 +9.2V IN
17 +9.2V IN
18 -4.4V IN
19 -4.8V IN
20 DETAIL IN
21 WHITE CLIP IN
22 CP IN
23 GROUND
24 GROUND
To MOTHER BOARD ······CN102
TP1 (G OUT)
TP2 (R OUT)
TP3 (B OUT)
TP4 (GROUND)
+8.8V/-4.4V REGULATOR
VR16 B WHITE CLIP
VR17 R WHITE CLIP
VR18 G WHITE CLIP
+8.8V
+9.2V
-4.4V
-4.8V
+2.5V
5
6
7

IC1	NJM4558M	B6
Q1	2SC2404-CDTW	E2
Q2	2SC2404-CDTW	E2
Q3	2SC2404-CDTW	E2
Q4	2SC2404-CDTW	E2
Q5	2SC2404-CDTW	E3
Q6	2SC2404-CDTW	E3
Q7	2SD601-Q	E3
Q8	2SC2404-CDTW	E3
Q9	2SB709-Q	E3
Q10	2SB709-Q	E3
Q11	2SB709-Q	E3
Q12	2SD601-Q	E4
Q13	2SD601-Q	E4
Q14	2SC2404-CDTW	E5
Q15	2SC2404-CDTW	E5
Q16	2SC2404-CDTW	E5
Q17	2SB709-Q	E5
Q18	2SB709-Q	E3
Q19	2SC2404-CDTW	E5
Q20	2SC2404-CDTW	E5
Q21	2SC2404-CDTW	D2
Q22	2SC2404-CDTW	D2
Q23	2SC2404-CDTW	D2
Q24	2SC2404-CDTW	D2
Q25	2SC2404-CDTW	D3
Q26	2SC2404-CDTW	D3
Q27	2SD601-Q	D3
Q28	2SC2404-CDTW	D3
Q29	2SB709-Q	D3
Q30	2SB709-Q	D3
Q31	2SB709-Q	D3
Q32	2SD601-Q	D4
Q33	2SD601-Q	D4
Q34	2SC2404-CDTW	D5
Q35	2SC2404-CDTW	D5
Q36	2SC2404-CDTW	D5
Q37	2SB709-Q	D5
Q38	2SB709-Q	D3
Q39	2SC2404-CDTW	D5
Q40	2SC2404-CDTW	D5
Q41	2SC2404-CDTW	C2
Q42	2SC2404-CDTW	C2
Q43	2SC2404-CDTW	C2
Q44	2SC2404-CDTW	C2
Q45	2SC2404-CDTW	C3
Q46	2SC2404-CDTW	C3
Q47	2SD601-Q	C3
Q48	2SC2404-CDTW	C3
Q49	2SB709-Q	C3
Q50	2SB709-Q	C3
Q51	2SB709-Q	C3
Q52	2SD601-Q	C4
Q53	2SD601-Q	C4
Q54	2SC2404-CDTW	C5
Q55	2SC2404-CDTW	C5
Q56	2SC2404-CDTW	C5
Q57	2SB709-Q	C5
Q58	2SB709-Q	C3
Q59	2SC2404-CDTW	C5
Q60	2SC2404-CDTW	C5
Q61	2SB709-Q	B5
Q62	2SD601-Q	B2
Q63	2SD601-Q	B2
Q64	2SD601-Q	A2
Q65	2SD601-Q	B2
Q66	2SD601-Q	B2
Q67	2SD601-Q	B3
Q68	2SD601-Q	B3
Q69	2SD601-Q	A3
Q70	2SD601-Q	B3
Q71	2SD601-Q	B3
Q72	2SD601-Q	B4
Q73	2SD601-Q	B4
Q74	2SD601-Q	A4
Q75	2SD601-Q	B4
Q76	2SD601-Q	B4
Q77	2SB709-Q	B5
Q78	2SB793-QR	B6
Q79	2SD973-QRS	B6
Q80	2SA1022-C	E4
Q81	2SA1022-C	D4
Q82	2SA1022-C	C4
D1	MA151K	A2
D2	MA151K	A3
D3	MA151K	A4

CONDUCTOR VIEW OF PROCESS-2 BOARD

Pin No.	1	2	3	4	5	6	7	8		
IC1	– 2.6	– 2.4	– 2.4	– 4.8	4.5	4.5	6.3	9.1		
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
B	2.3	2.3	2.3	2.3	2.3	2.3	8.1	0.3	2.5	2.3
C	8.8	8.8	8.8	8.1	8.1	8.1	8.8	2.5	0	0
E	1.6	1.7	1.7	1.6	1.6	1.6	7.4	2.3	3.2	3.0
	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
B	8.4	3.1	3.4	2.3	6.4	0.3	2.5	3.2	3.1	2.9
C	3.1	8.8	8.8	6.4	8.8	2.5	0	0	8.8	8.8
E	3.0	2.5	2.7	1.6	5.6	2.3	3.1	3.1	2.4	2.4
	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30
B	2.2	2.2	2.2	2.2	2.2	2.2	7.8	0.3	2.3	2.2
C	8.7	8.7	8.7	7.8	7.8	7.8	8.7	2.3	0	0
E	1.5	1.6	1.6	1.6	1.6	1.6	7.1	2.2	3.0	2.8
	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40
B	8.4	2.9	3.0	2.2	5.6	0.3	2.3	3.1	2.9	2.9
C	2.9	8.7	8.7	5.6	8.7	2.3	0	0	8.7	8.7
E	2.9	2.3	2.4	1.5	4.8	2.2	2.9	2.9	2.2	2.2
	Q41	Q42	Q43	Q44	Q45	Q46	Q47	Q48	Q49	Q50
B	2.2	2.2	2.2	2.2	2.2	2.2	7.8	0.3	2.3	2.2
C	8.7	8.7	8.7	7.7	7.8	7.7	8.7	2.3	0	0
E	1.5	1.6	1.6	1.6	1.6	1.6	7.1	2.2	3.0	2.8
	Q51	Q52	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q60
B	8.4	2.9	3.0	2.2	5.6	0.3	2.3	3.1	2.9	2.8
C	2.9	8.7	8.7	5.6	8.7	2.3	0	0	8.7	8.7
E	2.9	2.3	2.4	1.5	4.9	2.2	2.9	2.9	2.2	2.2
	Q61	Q62	Q63	Q64	Q65	Q66	Q67	Q68	Q69	Q70
B	2.3	2.7	2.5	0.8	2.3	2.3	2.4	2.6	0.8	2.2
C	0	8.8	8.8	2.4	8.8	8.8	8.7	8.7	2.5	8.7
E	2.9	2.4	2.4	2.3	1.7	1.7	2.3	2.2	2.2	1.6
	Q71	Q72	Q73	Q74	Q75	Q76	Q77	Q78	Q79	Q80
B	2.2	2.4	2.4	0.8	2.2	2.2	8.7	8.4	– 4.0	2.6
C	8.7	8.7	8.7	2.0	8.7	8.7	3.4	8.8	– 4.4	0.8
E	1.6	2.2	2.0	2.2	1.6	1.6	8.8	9.1	– 4.7	3.4
	Q81	Q82								
B	2.3	2.3								
C	1.3	1.2								
E	3.0	3.0								

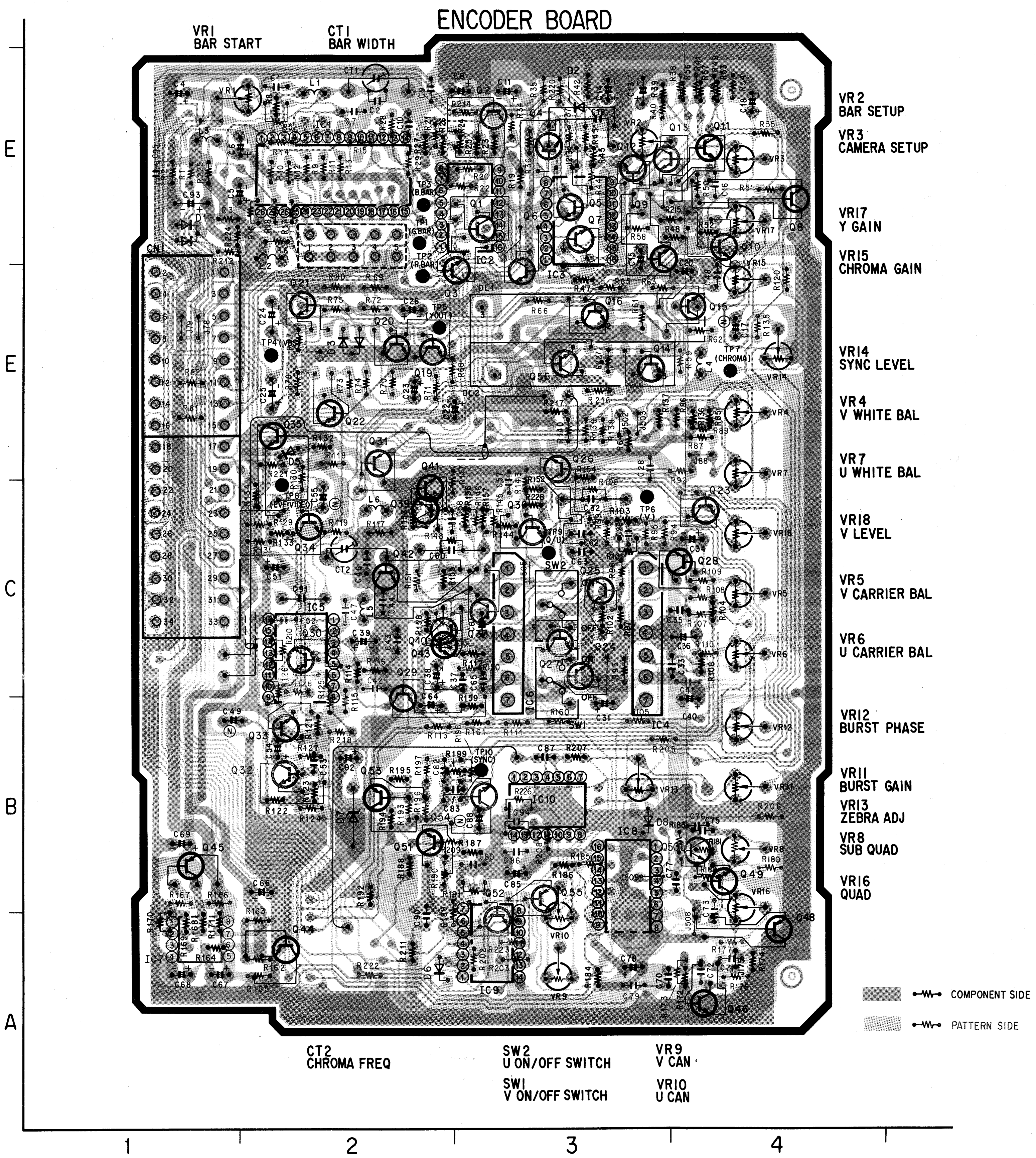

NJM4558M
2SC2404-CDTW
2SD601-Q
2SB709-Q
2SB793-QR
MA151K
5
8
1
4
C
B
E
B C E
2
1
3
2
1
3


PROCESS-2 BOARD
E
D
C
B
A
1
2
3
4
VR3
G GAIN
VR1
G GAMMA
GAIN
VR2
G.HI-GAIN
GAMMA
VR21
G.GAMMA
VR19
R PHASE
VR6
R.GAIN
VR4
R.GAMMA
GAIM
VR5
R.HI-GAIN
GAMMA
VR22
R.GAMMA
VR20
B PHASE
VR9
B GAIN
VR7
B.GAMMA
GAIN
VR8
B HI-GAIN
GAMMA
VR23
B GAMMA
VR18
G WHITE
CLIP
VR17
R WHITE
CLIP
VR16
B WHITE
CLIP
COMPONENT
SIDE
PATTERN SIDE
TP5 (G IN)
TP1 (G OUT)
TP2 (R OUT)
TP6 (R IN)
TP7 (B IN)
TP3 (B OUT)
TP4 (GROUND)
CN1
CN2
DL1
DL2
DL3
IC1
ON
SW1
OFF
SW1
MATRIX ON/OFF
SWITCH
VR14
R+(R-B)
VR15
B+(B-R)
VR12
G+(G-R)
VR13
R+(R-G)
VR10
B+(B-G)
VR11
G+(G-B)

IC1	NJM4558M	A1
Q1	2SC2404-CDTW	E2
Q2	2SC2404-CDTW	E2
Q3	2SC2404-CDTW	E2
Q4	2SC2404-CDTW	E2
Q5	2SC2404-CDTW	E2
Q6	2SC2404-CDTW	E2
Q7	2SD601-Q	E2
Q8	2SC2404-CDTW	E2
Q9	2SB709-Q	E2
Q10	2SB709-Q	E2
Q11	2SB709-Q	E4
Q12	2SD601-Q	E4
Q13	2SD601-Q	E4
Q14	2SC2404-CDTW	E3
Q15	2SC2404-CDTW	E3
Q16	2SC2404-CDTW	E3
Q17	2SB709-Q	E3
Q18	2SB709-Q	E3
Q19	2SC2404-CDTW	E3
Q20	2SC2404-CDTW	E3
Q21	2SC2404-CDTW	D2
Q22	2SC2404-CDTW	D2
Q23	2SC2404-CDTW	D2
Q24	2SC2404-CDTW	D2
Q25	2SC2404-CDTW	D2
Q26	2SC2404-CDTW	D2
Q27	2SD601-Q	D2
Q28	2SC2404-CDTW	D2
Q29	2SB709-Q	D2
Q30	2SB709-Q	D2
Q31	2SB709-Q	D3
Q32	2SD601-Q	D4
Q33	2SD601-Q	D4
Q34	2SC2404-CDTW	D3
Q35	2SC2404-CDTW	D3
Q36	2SC2404-CDTW	D3
Q37	2SB709-Q	D3
Q38	2SB709-Q	D3
Q39	2SC2404-CDTW	D3
Q40	2SC2404-CDTW	D3
Q41	2SC2404-CDTW	C2
Q42	2SC2404-CDTW	C2
Q43	2SC2404-CDTW	C2
Q44	2SC2404-CDTW	C2
Q45	2SC2404-CDTW	C2
Q46	2SC2404-CDTW	C2
Q47	2SD601-Q	C2
Q48	2SC2404-CDTW	C2
Q49	2SB709-Q	C2
Q50	2SB709-Q	C2
Q51	2SB709-Q	C4
Q52	2SD601-Q	C4
Q53	2SD601-Q	C4
Q54	2SC2404-CDTW	C3
Q55	2SC2404-CDTW	C3
Q56	2SC2404-CDTW	C3
Q57	2SB709-Q	C3
Q58	2SB709-Q	C3
Q59	2SC2404-CDTW	C3
Q60	2SC2404-CDTW	C3
Q61	2SB709-Q	E2
Q62	2SD601-Q	B3
Q63	2SD601-Q	B3
Q64	2SD601-Q	A3
Q65	2SD601-Q	B3
Q66	2SD601-Q	B3
Q67	2SD601-Q	B3
Q68	2SD601-Q	B3
Q69	2SD601-Q	A3
Q70	2SD601-Q	B3
Q71	2SD601-Q	B2
Q72	2SD601-Q	B2
Q73	2SD601-Q	B2
Q74	2SD601-Q	A2
Q75	2SD601-Q	B2
Q76	2SD601-Q	B2
Q77	2SB709-Q	B4
Q78	2SB793-QR	A1
Q79	2SD973-QRS	A1
Q80	2SA1022-C	E3
Q81	2SA1022-C	D3
Q82	2SA1022-C	C3
D1	MA151K	A3
D2	MA151K	A3
D3	MA151K	A2

CONDUCTOR VIEW OF ENCODER BOARD

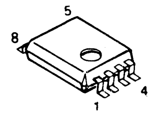
IC1	MN50005LVD	E2
IC2	MN4053BS	E3
IC3	TC4053BF	E3
IC4	AN614	C3
IC5	TC4053BF	C2
IC6	AN614	C3
IC7	NJM2904M	A1
IC8	MN4053BS	B3
IC9	MN4001BS	A3
IC10	NJM319M	B3
Q1	2SD601-RS	E3
Q2	2SD601-RS	E3
Q3	2SD601-RS	D3
Q4	2SC2404-CDTW	E3
Q5	2SC2404-CDTW	E3
Q6	2SD601-RS	E3
Q7	2SD601-RS	E3
Q8	2SC2404-CDTW	E4
Q9	2SD601-RS	E3
Q10	2SC2404-CDTW	E4
Q11	2SD601-RS	E4
Q12	2SD601-RS	E3
Q13	2SD601-RS	E4
Q14	2SD601-RS	D3
Q15	2SC2404-CDTW	D4
Q16	2SD601-RS	D3
Q19	2SC2404-CDTW	D2
Q20	2SC2404-CDTW	D2
Q21	2SD601-RS	D2
Q22	2SB709-Q	D2
Q23	2SD601-RS	C4
Q24	2SD601-RS	C3
Q25	2SD601-RS	C3
Q26	2SD601-RS	D3
Q27	2SD601-RS	C3
Q28	2SD601-RS	C4
Q29	2SD601-RS	B2
Q30	2SB709-Q	C2
Q31	2SB709-Q	D2
Q32	2SD601-RS	B2
Q33	2SD601-RS	B2
Q34	2SD601-RS	C2
Q35	2SD601-RS	C2
Q36	2SD601-RS	C3
Q37	2SD601-RS	C3
Q39	2SD601-RS	C2
Q40	2SD601-RS	C2
Q41	2SD601-RS	C2
Q42	2SD601-RS	C2
Q43	2SD601-RS	C2
Q44	2SB710-Q	A2
Q45	2SB793A-RS	B1
Q46	2SD601-RS	A4
Q48	2SB709-Q	A4
Q49	2SD601-RS	B4
Q50	2SD601-RS	B4
Q51	2SB709-Q	B2
Q52	2SD601-RS	A3
Q53	2SB709-Q	B2
Q54	2SD601-RS	B3
Q55	2SB709-Q	B3
Q56	2SD601-RS	D3
D1	MA151WK	E1
D2	MA4043M	E3
D3	MA157TW	D2
D5	MA151K	C2
D6	MA151K	A2
D7	MA4043M	B2
D8	MA157TW	B3


ENCODER BOARD
VR1 BAR START
CT1 BAR WIDTH
VR2 BAR SETUP
VR3 CAMERA SETUP
VR17 Y GAIN
VR15 CHROMA GAIN
VR14 SYNC LEVEL
VR4 V WHITE BAL
VR7 U WHITE BAL
VR18 V LEVEL
VR5 V CARRIER BAL
VR6 U CARRIER BAL
VR12 BURST PHASE
VR11 BURST GAIN
VR13 ZEBRA ADJ
VR8 SUB QUAD
VR16 QUAD
CT2 CHROMA FREQ
SW2 U ON/OFF SWITCH
SW1 V ON/OFF SWITCH
VR9 V CAN
VR10 U CAN
COMPONENT SIDE
PATTERN SIDE
E
D
C
B
A
1
2
3
4

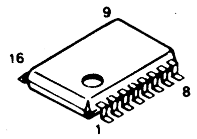
Pin No.	IC1	IC2	IC3	IC4	IC5	IC6	IC7	IC8	IC9	IC10
1	3.1(0.7)	2.4(2.2)	4.8(4.8)	3.4(3.4)	5.5(5.5)	3.4(3.4)	3.4(3.4)	0(0)	8.7(0.6)	0(0.8)
2	0(1.9)	2.1(2.5)	4.7(4.6)	4.2(4.2)	5.3(5.3)	4.2(4.2)	4.6(4.6)	8.8(8.8)	8.7(0.6)	0(0.9)
3	0.6(2.1)	2.3(2.2)	5.4(5.4)	4.2(4.2)	4.5(4.5)	4.2(4.2)	4.6(4.6)	0.6(0.1)	0(8.8)	0(0)
4	0.6(2.1)	2.2(2.5)	5.4(5.5)	0(0)	4.5(4.5)	0(0)	0(0)	0.6(0.1)	0.8(−)	4.2(4.2)
5	0(0)	2.1(2.5)	5.4(0)	3.4(3.4)	4.5(4.5)	3.4(3.4)	2.9(2.9)	0.7(0.1)	0.3(−)	5.0(1.8)
6	5.1(3.6)	0(0)	3.4(3.4)	8.8(8.9)	1.7(1.7)	8.8(8.8)	2.9(2.9)	−(0)	7.0(−)	−(0)
7	0.3(0.3)	0(0)	3.4(3.4)	5.0(5.2)	1.7(1.7)	5.1(5.2)	2.3(2.3)	−(0)	0(0)	−(0)
8	3.1(0.7)	0(0)	3.4(3.4)		1.7(1.7)		9.2(9.2)	−(0)	0(8.8)	−(0)
9	5.1(3.6)	8.7(2.7)	2.6(2.6)		0.8(0.8)			−(8.8)	0(−)	− 1.4(− 1.0)
10	5.1(3.9)	8.7(2.7)	7.0(7.0)		8.8(8.8)			−(0)	8.8(0.1)	− 1.4(− 1.0)
11	0(0)	8.7(2.7)	8.7(2.7)		0(0)			−(8.8)	8.4(−)	8.8(8.8)
12	0(0)	2.1(2.5)	5.2(5.2)		8.8(8.8)			−(8.8)	0.3(−)	0.3(8.8)
13	0(0)	2.3(2.2)	5.3(5.3)		0(0)			−(0)	0.3(−)	0(0)
14	0(0)	2.3(2.5)	5.3(5.2)		0(7.2)			−(0)	8.8(−)	0(− 1.2)
15	5.1(5.1)	2.3(2.5)	4.8(4.8)		5.5(5.5)			−(8.8)		
16	0(0)	8.8(8.8)	8.8(8.8)		8.8(8.8)			−(8.8)		
17	5.1(5.0)									
18	0(0.8)									
19	0(0.7)									
20	0(1.1)									
21	0(0)									
22	0(0)									
23	0(0)									
24	0(0)									
25	5.1(5.1)									
26	5.1(5.1)									
27	1.3(1.3)									
28	5.1(5.1)									

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
B	2.2(2.5)	2.2(2.5)	2.2(2.5)	2.9(2.9)	6.5(6.8)	5.3(5.5)	5.3(5.2)	4.7(4.8)	4.7(4.8)	5.1(5.1)
C	8.7(8.7)	8.7(8.7)	8.7(8.7)	6.5(6.8)	8.8(8.8)	8.8(8.8)	8.8(8.8)	8.8(8.8)	8.7(8.7)	5.5(5.7)
E	1.6(1.9)	1.6(1.9)	1.6(1.9)	2.1(2.2)	5.8(6.0)	4.7(4.8)	4.6(4.6)	4.0(4.1)	4.1(4.2)	4.4(4.4)
	Q11	Q12	Q13	Q14	Q15	Q16	Q19	Q20	Q21	Q22
B	4.7(4.8)	5.5(5.7)	5.5(5.7)	2.3(2.4)	2.7(2.9)	3.9(4.1)	2.8(2.8)	2.7(2.7)	3.6(3.6)	2.3(2.3)
C	8.8(8.8)	8.8(8.8)	8.8(8.8)	8.8(8.8)	3.9(4.1)	8.8(8.8)	8.8(8.8)	3.6(3.6)	8.8(8.8)	0(0)
E	4.1(4.2)	4.9(4.9)	4.9(5.1)	1.6(1.7)	2.1(2.1)	3.3(3.5)	2.0(2.0)	2.0(2.0)	3.0(3.0)	2.9(2.9)
	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q32
B	2.2(2.3)	6.0(6.0)	2.7(2.7)	0.6(0.6)	3.1(3.1)	0.3(0.3)	5.0(5.0)	4.5(4.5)	0.4(0.4)	2.8(2.8)
C	6.1(6.1)	8.8(8.8)	8.8(8.8)	3.1(3.1)	8.8(8.8)	3.4(3.4)	8.8(8.8)	0(0)	0(0)	6.1(6.1)
E	1.6(1.7)	5.4(5.4)	2.1(2.1)	0(0)	2.5(2.5)	3.4(3.4)	4.5(4.5)	5.0(5.0)	1.0(1.0)	2.2(2.2)
	Q33	Q34	Q35	Q36	Q37	Q38	Q41	Q42	Q43	Q44
B	6.1(6.1)	5.8(5.8)	5.5(5.5)	2.3(2.3)	5.9(5.9)	3.7(3.7)	0.5(0.5)	2.1(2.1)	0.3(0.3)	2.3(2.3)
C	8.8(8.8)	8.8(8.8)	8.8(8.8)	6.0(6.0)	8.8(8.8)	8.8(8.8)	2.1(2.1)	8.8(8.8)	3.4(3.4)	0(0)
E	5.5(5.5)	5.3(5.3)	4.9(4.9)	1.7(1.7)	5.3(5.3)	3.1(3.1)	0(0)	1.5(1.5)	3.4(3.4)	2.9(2.9)
	Q45	Q46	Q47	Q50	Q51	Q52	Q53	Q54	Q55	Q56
B	8.4(8.4)	3.1(3.1)	2.2(2.2)	−	3.4(3.4)	4.0(4.0)	4.1(4.1)	4.6(4.6)	8.8(1.2)	2.3(2.4)
C	8.8(8.8)	6.6(6.6)	0(0)	8.8(8.8)	0(0)	8.8(8.8)	0(0)	8.8(8.8)	5.4(1.9)	8.8(8.8)
E	9.2(9.2)	2.8(2.8)	2.6(2.6)	−	4.0(4.0)	3.4(3.4)	4.7(4.7)	4.0(4.0)	8.8(1.9)	1.7(1.8)

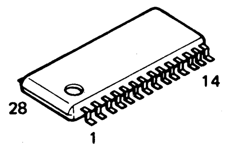
NJM2904M



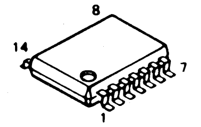
TC4063BF
MN4053BS



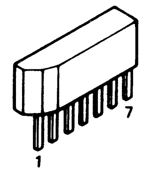
MN50005LVD



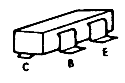
MN4001BS
NJM319M



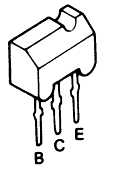
AN614



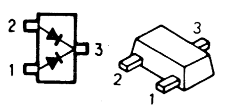
2SD601-RS
2SC2404-CDTW
2SB709-Q



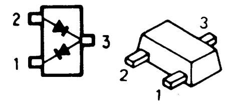
2SB793A-RS



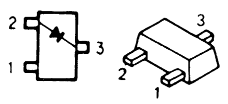
MA151WK



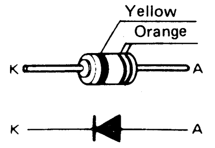
MA157TW



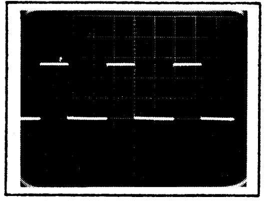
MA151K

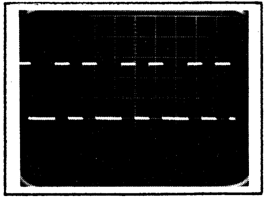


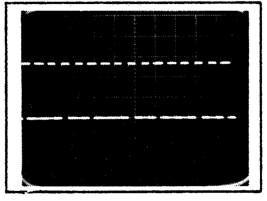
MA4043M

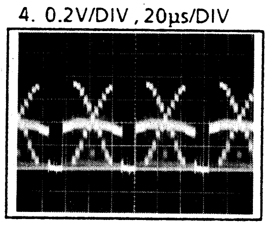

Yellow
Orange
K
A
K
A

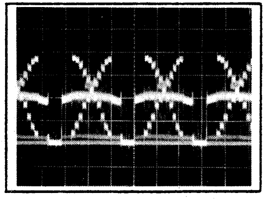
SCHEMATIC DIAGRAM OI

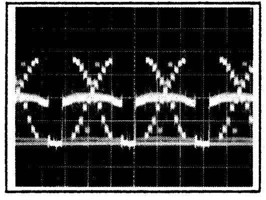

1. 0.2V/DIV , 20µs/DIV

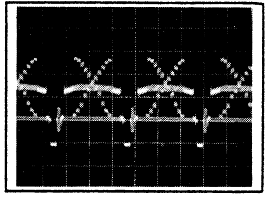

2. 0.2V/DIV , 20µs/DIV


3. 0.2V/DIV , 20µs/DIV

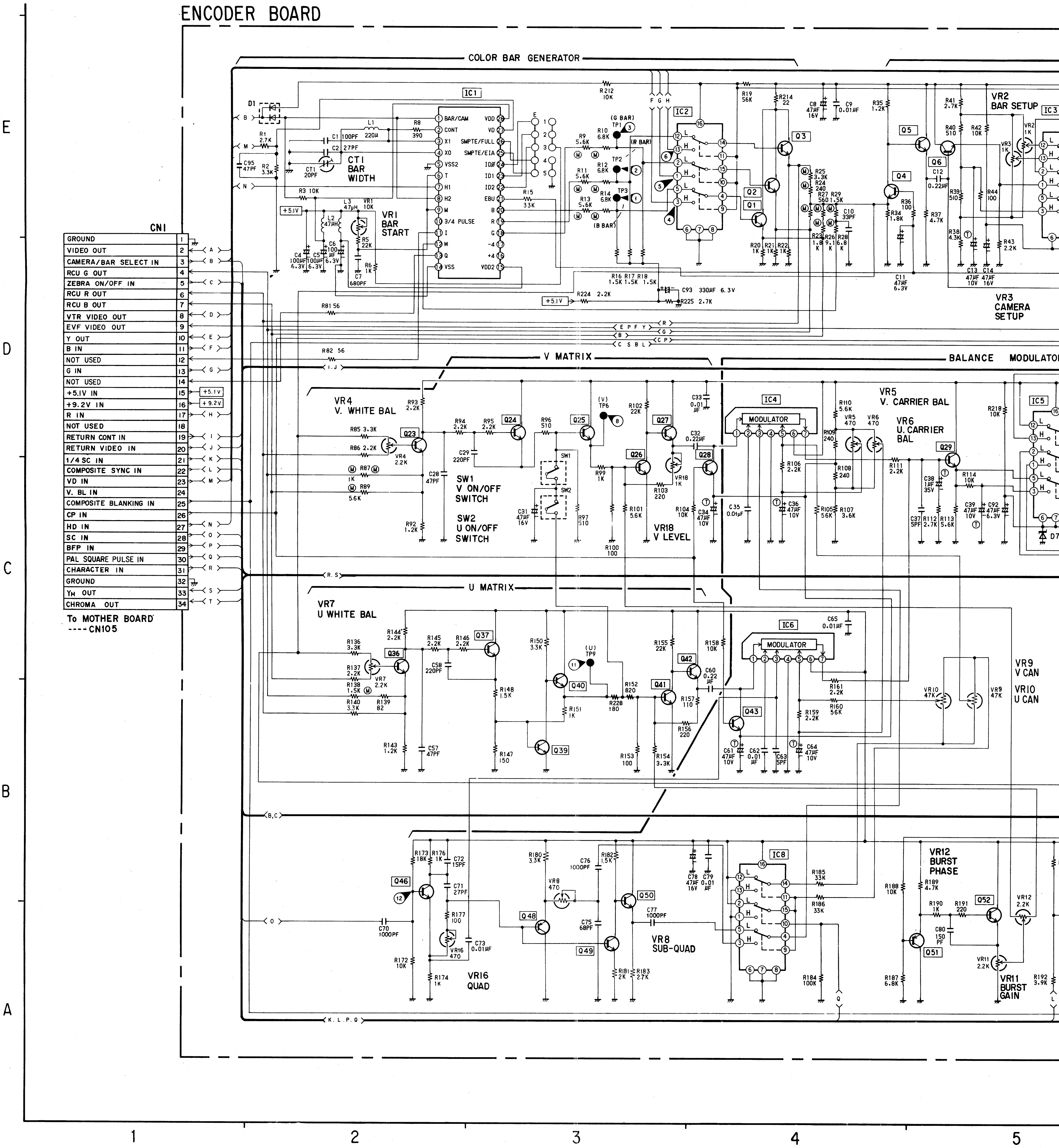

4. 0.2V/DIV , 20µs/DIV


5. 0.2V/DIV , 20µs/DIV


6. 0.2V/DIV , 20µs/DIV


7. 0.5V/DIV , 20µs/DIV

8.

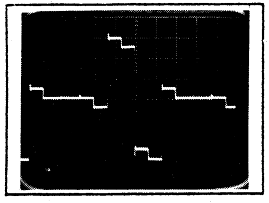

ENCODER BOARD
COLOR BAR GENERATOR
V MATRIX
BALANCE MODULATOR
U MATRIX
IC1
IC2
IC3
IC4
IC5
IC6
IC8
MODULATOR
BAR/CAM
CONT
X1
X0
VSS2
T
H1
H2
M
3/4 PULSE
I
W
Q
VSS
VDD
VD
SMPTE/FULL
SMPTE/EIA
ID0
ID1
ID2
EBU
B
R
G
-4
+4
VDD2
CT1 BAR WIDTH
VR1 BAR START
VR2 BAR SETUP
VR3 CAMERA SETUP
VR4 V. WHITE BAL
VR5 V. CARRIER BAL
VR6 U. CARRIER BAL
VR7 U WHITE BAL
VR8 SUB-QUAD
VR9 V CAN
VR10 U CAN
VR11 BURST GAIN
VR12 BURST PHASE
VR16 QUAD
VR18 V LEVEL
SW1 V ON/OFF SWITCH
SW2 U ON/OFF SWITCH
TP1
TP2
TP3
TP6
TP9
(G BAR)
(R BAR)
(B BAR)
(V)
(U)
Q1
Q2
Q3
Q4
Q5
Q6
Q23
Q24
Q25
Q26
Q27
Q28
Q29
Q36
Q37
Q39
Q40
Q41
Q42
Q43
Q46
Q48
Q49
Q50
Q51
Q52
D1
+5.1V
+9.2V
R224 2.2K
R225 2.7K
C93 330µF 6.3V
R81 56
R82 56
E P F Y
B
C S B L
R
G
C P
I, J
R, S
B, C
K, L, P, Q
To MOTHER BOARD
----CN105
CN1
E
D
C
B
A
1
2
3
4
5

CN1

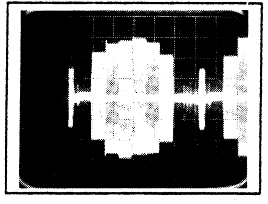
GROUND	1
VIDEO OUT	2
CAMERA/BAR SELECT IN	3
RCU G OUT	4
ZEBRA ON/OFF IN	5
RCU R OUT	6
RCU B OUT	7
VTR VIDEO OUT	8
EVF VIDEO OUT	9
Y OUT	10
B IN	11
NOT USED	12
G IN	13
NOT USED	14
+5.1V IN	15
+9.2V IN	16
R IN	17
NOT USED	18
RETURN CONT IN	19
RETURN VIDEO IN	20
1/4 SC IN	21
COMPOSITE SYNC IN	22
VD IN	23
V. BL IN	24
COMPOSITE BLANKING IN	25
CP IN	26
HD IN	27
SC IN	28
BFP IN	29
PAL SQUARE PULSE IN	30
CHARACTER IN	31
GROUND	32
Y_H OUT	33
CHROMA OUT	34

To MOTHER BOARD
----CN105

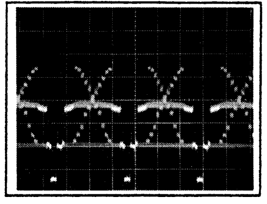
M OF ENCODER BOARD



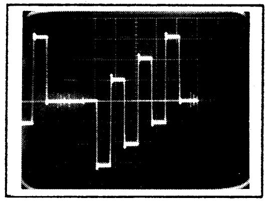
8. 0.2V/DIV, 10µs/DIV



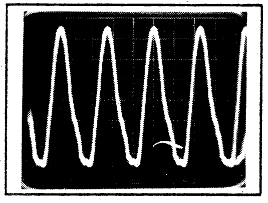
9. 50mV/DIV, 10µs/DIV



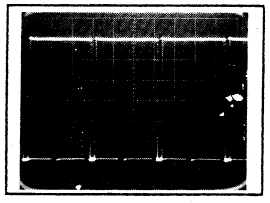
10. 0.2V/DIV, 20µs/DIV



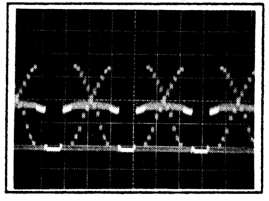
11. 0.2V/DIV, 10µs/DIV



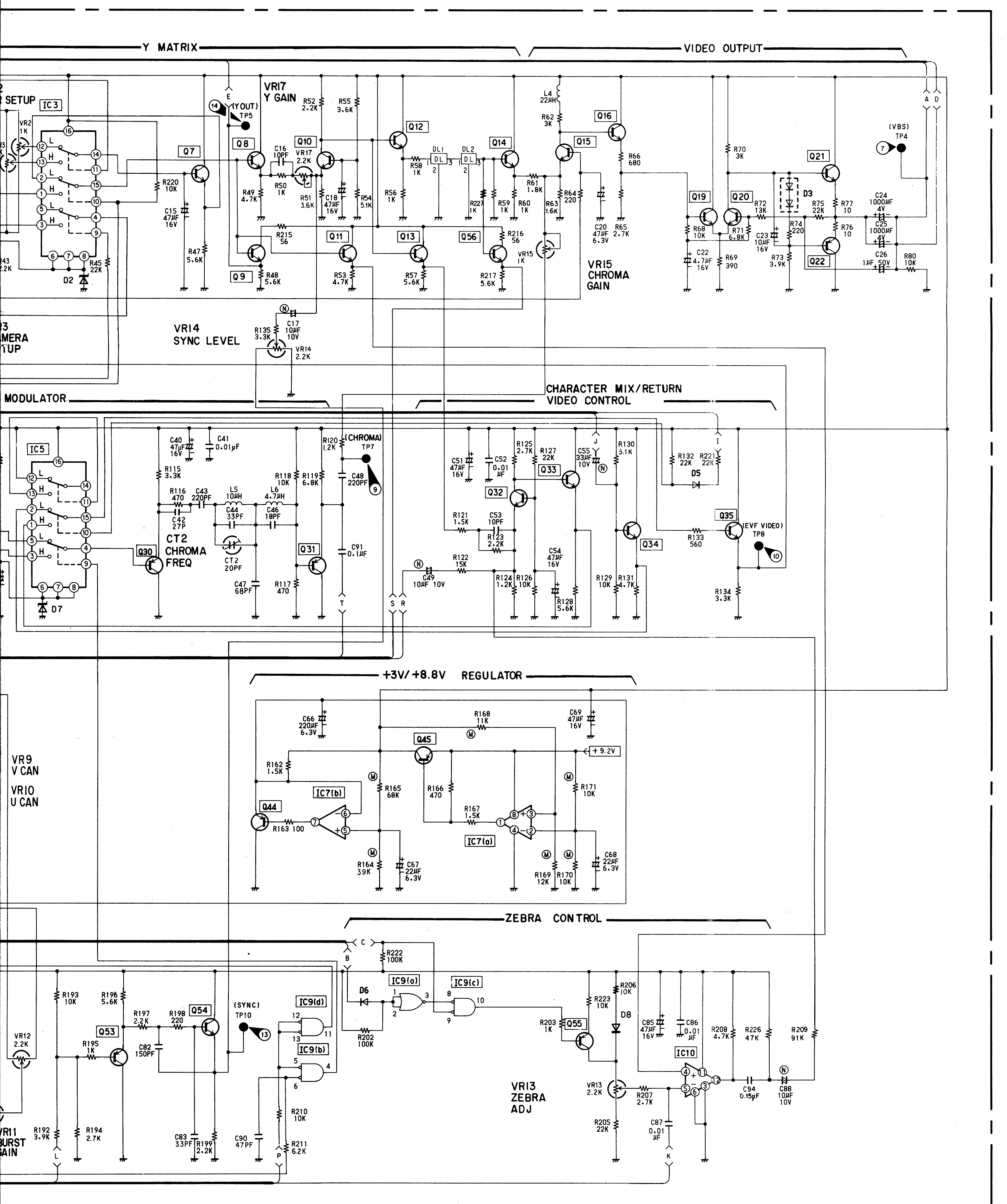
12. 0.1V/DIV, 0.1µs/DIV



13. 0.5V/DIV, 20µs/DIV



14. 0.2V/DIV, 20µs/DIV

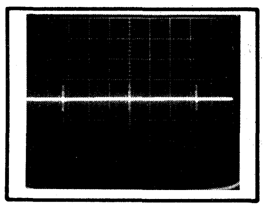


Y MATRIX
VIDEO OUTPUT
SETUP
IC3
VRI7 Y GAIN
(Y OUT) TP5
(VBS) TP4
VR15 CHROMA GAIN
VR14 SYNC LEVEL
MERA TUP
MODULATOR
CHARACTER MIX/RETURN VIDEO CONTROL
IC5
(CHROMA) TP7
(EVF VIDEO) TP8
CT2 CHROMA FREQ
+3V/+8.8V REGULATOR
IC7(b)
IC7(a)
+9.2V
VR9 V CAN
VR10 U CAN
ZEBRA CONTROL
IC9(a)
IC9(b)
IC9(c)
IC9(d)
IC10
(SYNC) TP10
VR12
VR13 ZEBRA ADJ
VRI1 URST AIN
5
6
7
8

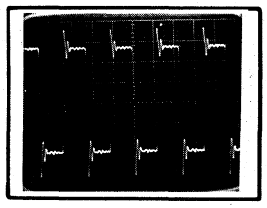
IC1	MN50005LVD	E3
IC2	MN4053BS	E4
IC3	TC4053BF	E5
IC4	AN614	D4
IC5	TC4053BF	D5
IC6	AN614	C4
IC7	NJM2904M	B7
IC8	MN4053BS	B4
IC9	MN4001BS	A6
IC10	NJM319M	A8
Q1	2SD601-RS	E4
Q2	2SD601-RS	E4
Q3	2SD601-RS	E4
Q4	2SC2404-CDTW	E4
Q5	2SC2404-CDTW	E5
Q6	2SD601-RS	E5
Q7	2SD601-RS	E6
Q8	2SC2404-CDTW	E6
Q9	2SD601-RS	E6
Q10	2SC2404-CDTW	E6
Q11	2SD601-RS	E6
Q12	2SD601-RS	E6
Q13	2SD601-RS	E6
Q14	2SD601-RS	E7
Q15	2SC2404-CDTW	E7
Q16	2SD601-RS	E7
Q19	2SC2404-CDTW	E8
Q20	2SC2404-CDTW	E8
Q21	2SD601-RS	E8
Q22	2SB709-Q	E8
Q23	2SD601-RS	D2
Q24	2SD601-RS	D3
Q25	2SD601-RS	D3
Q26	2SD601-RS	C3
Q27	2SD601-RS	D3
Q28	2SD601-RS	C4
Q29	2SD601-RS	D5
Q30	2SB709-Q	C6
Q31	2SB709-Q	C6
Q32	2SD601-RS	D7
Q33	2SD601-RS	D7
Q34	2SD601-RS	C7
Q35	2SD601-RS	D8
Q36	2SD601-RS	C2
Q37	2SD601-RS	C3
Q39	2SD601-RS	B3
Q40	2SD601-RS	B3
Q41	2SD601-RS	B3
Q42	2SD601-RS	C4
Q43	2SD601-RS	B4
Q44	2SB710-Q	B6
Q45	2SB793A-RS	C7
Q46	2SD601-RS	B2
Q48	2SB709-Q	A3
Q49	2SD601-RS	A3
Q50	2SD601-RS	B3
Q51	2SB709-Q	A5
Q52	2SD601-RS	A5
Q53	2SB709-Q	A5
Q54	2SD601-RS	B6
Q55	2SB709-Q	B7
Q56	2SD601-RS	E7
D1	MA151WK	E2
D2	MA4043M	D5
D3	MA157TW	E8
D5	MA151K	D8
D6	MA151K	B6
D7	MA4043M	C5
D8	MA157TW	B7

SCHEMATIC DIAGRAM

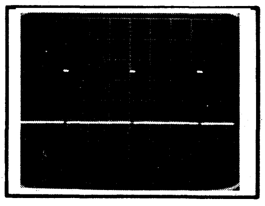
1. 2V/DIV, 1µs/DIV



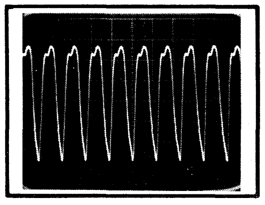
2. 1V/DIV, 0.1µs/DIV



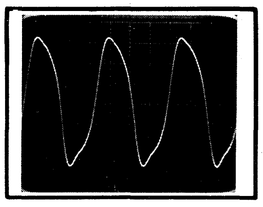
3. 2V/DIV, 20µs/DIV



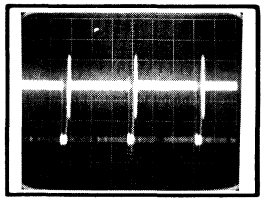
4. 0.5V/DIV, 0.05µs/DIV



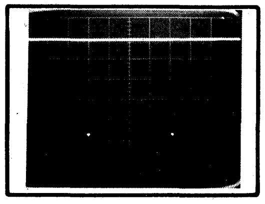
5. 1V/DIV, 0.01µs/DIV



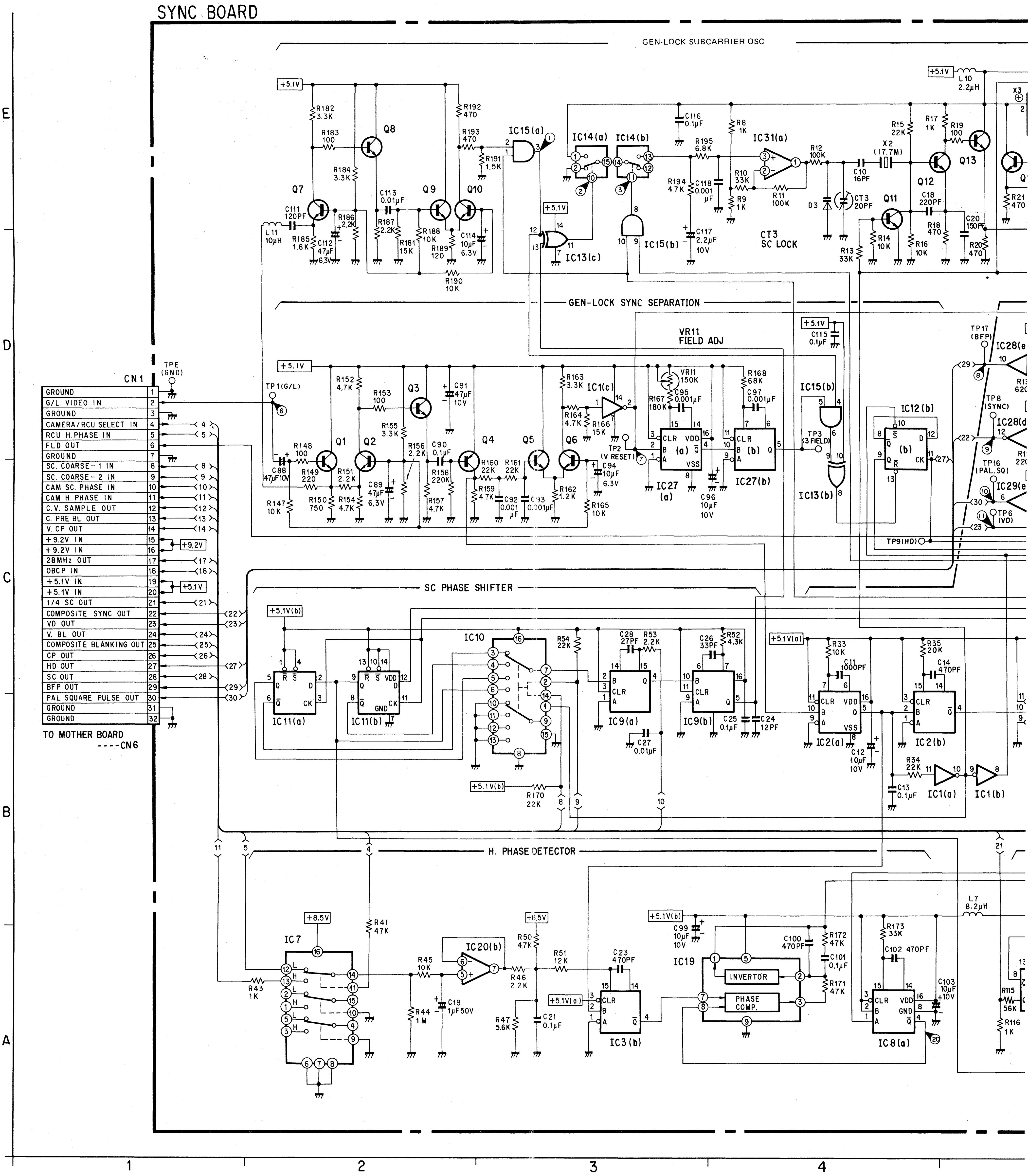
6. 0.1V/DIV, 20µs/DIV



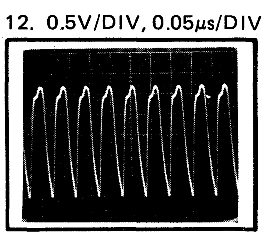
7. 1V/DIV, 5ms/DIV



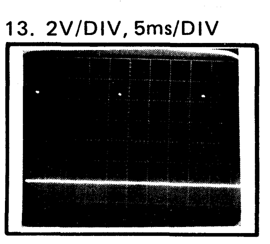
8. 2



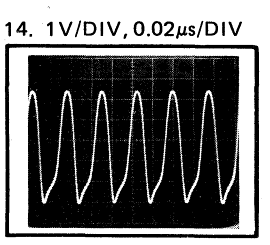
12. 0.5V/DIV, 0.05µs/DIV



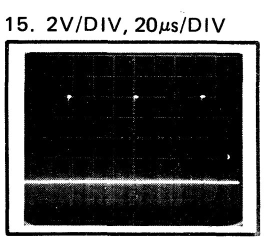
13. 2V/DIV, 5ms/DIV



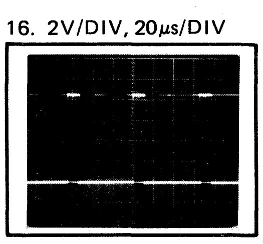
14. 1V/DIV, 0.02µs/DIV



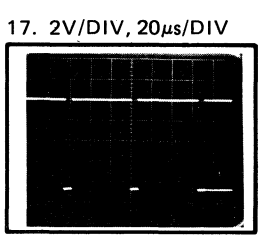
15. 2V/DIV, 20µs/DIV



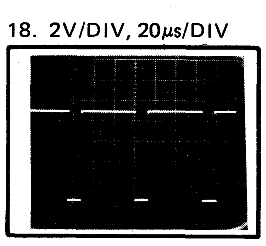
16. 2V/DIV, 20µs/DIV



17. 2V/DIV, 20µs/DIV



18. 2V/DIV, 20µs/DIV

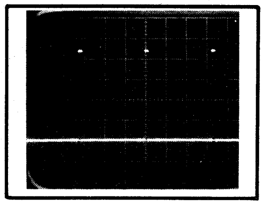


19. 2

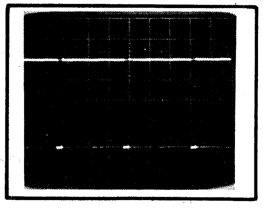
AGRAM OF SYNC BOARD

/DIV

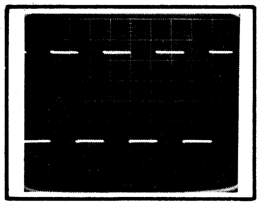
8. 2V/DIV, 20μs/DIV



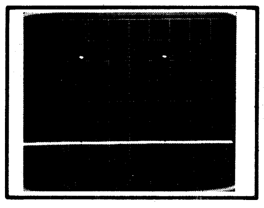
9. 2V/DIV, 20μs/DIV

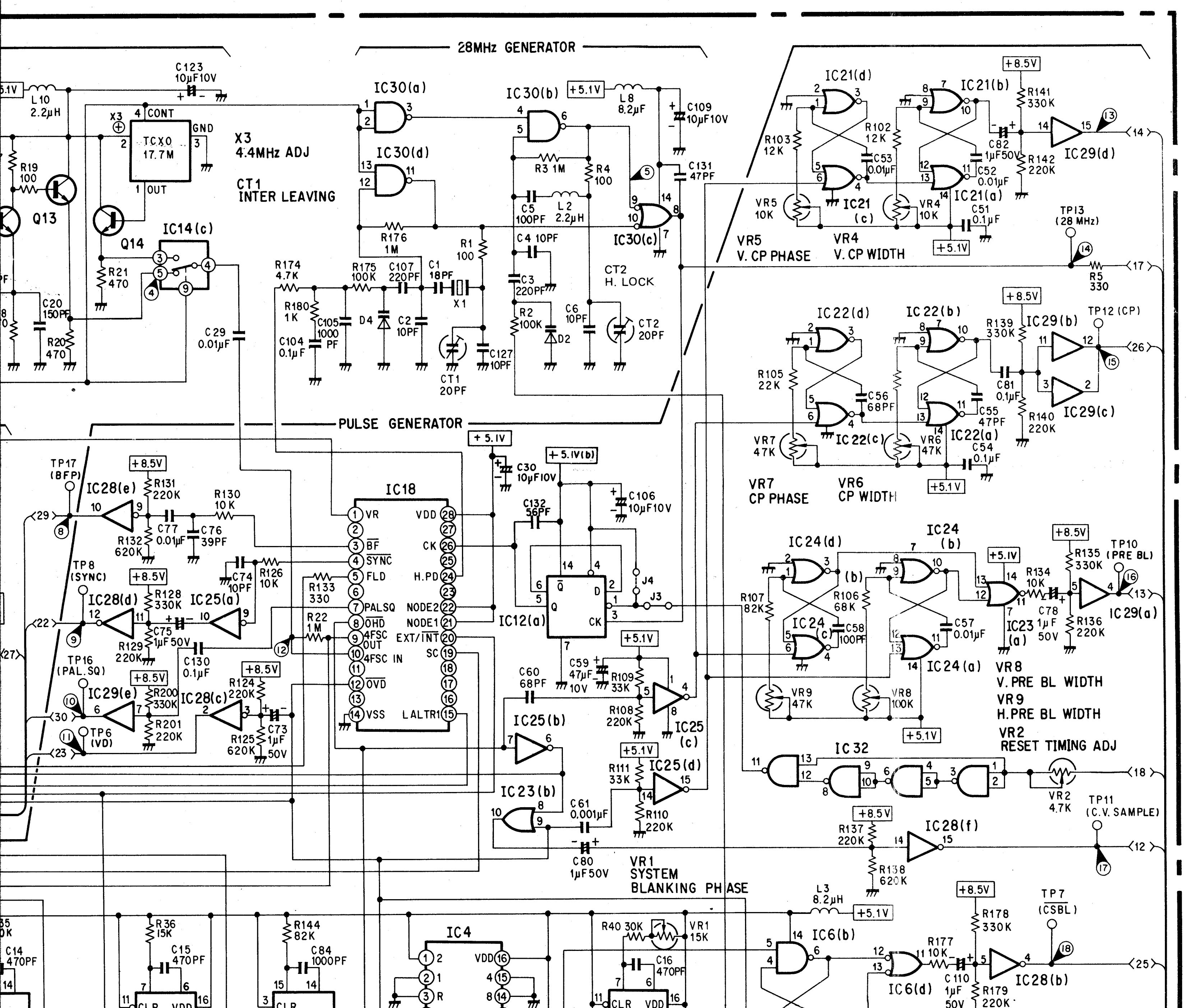


10. 2V/DIV, 50μs/DIV



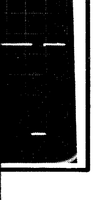
11. 2V/DIV, 5ms/DIV



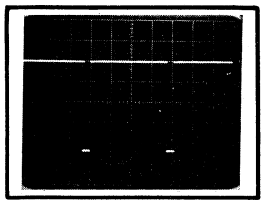


SYNC BOARD			
IC1	MN74HC04S		A7, B5, D3
IC2	MN74HC221S		B4
IC3	MN74HC221S		A3, B5
IC4	HD14557BP		B6, C6
IC5	MN74HC221S		B5, B6
IC6	MN74HC00S		B7, C7
IC7	MN4053BS		A2
IC8	MN74HC221S		A4
IC9	SN74LS221S		C3, C4
IC10	MN74HC153S		B3, C3
IC11	MN74HC74S		B2, C2
IC12	MN74HC74S		D4, D6
IC13	MN74HC86S		C4, D3
IC14	MN74HC4053S		E3, E5
IC15	MN74HC08S		D4, E3
IC18	YWCX7930A		C6, D6
IC19	TC5081AP		A4
IC20	NJM2904M		A2, A3, A7
IC21	MN4001BS		E7
IC22	MN4001BS		D7
IC23	MN4071BS		C6, D7
IC24	MN4001BS		D7
IC25	MN4049BS		C6, D5
IC26	MN74HC74S		A5
IC27	MN74HC221S		D3, D4
IC28	MN4049BS		B7, C5, C7, D5
IC29	MN4050BS		C5, D8, E8
IC30	MN74HC00S		E6
IC31	NJM2904M		E4
IC32	MN74HC00S		C7
Q1	2SD601-RS	(Y)	C2, D2
Q2	2SD601-RS	(Y)	C2, D2
Q3	2SD601-RS	(Y)	D2
Q4	2SA1022-C	(E)	C2, D2
Q5	2SC2404-CDTW	(U)	C3, D3
Q6	2SC2404-CDTW	(U)	C3, D3
Q7	2SD601-RS	(Y)	E2
Q8	2SD601-RS	(Y)	E2
Q9	2SC2404-CDTW	(U)	E2
Q10	2SC2404-CDTW	(U)	E2
Q11	2SC2404-CDTW	(U)	E4
Q12	2SC2404-CDTW	(U)	E5
Q13	2SC2404-CDTW	(U)	E5
Q14	2SC2404-CDTW	(U)	E5
Q15	2SB793-RS		A7
Q18	2SC2404-CDTW	(U)	A6
Q19	2SC2404-CDTW	(U)	A6
D2	YWFC54M		D6
D3	YWFC54M		E4
D4	YWFC54M		D6, E6

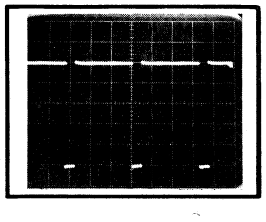
s/DIV



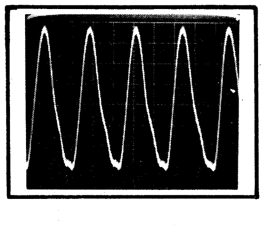
19. 2V/DIV, 5ms/DIV



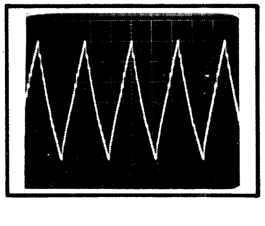
20. 1V/DIV, 20μs/DIV



21. 0.1V/DIV, 0.1μs/DIV



22. 0.2V/DIV, 0.1μs/DIV



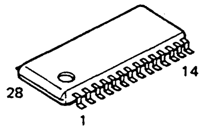
CONDUCTOR VIEW OF SYNC BOARD

	IC1	IC2	IC3	IC4	IC5	IC6	IC7	IC8	IC9	IC10	IC11	IC12	IC13	IC14	IC15
Pin 1	3.3	0	0	5.0	0	5.0	1.4	4.5	0	5.0	5.0	5.0	0	5.0	0
2	0.2	0	0	0	4.5	4.7	1.4	5.0	0	0	-5.3	-9.3	0	0	1.6
3	2.5	5.0	5.0	0	5.0	0.4	1.4	5.0	5.0	-5.9	2.5	----	0	2.6	0
4	2.0	5.0	0	4.5	2.4	0.4	1.4	4.4	4.4	-6.0	5.0	0	0	2.5	0
5	0	0	0	2.6	0.9	5.0	1.4	----	0	-5.7	-5.7	-6.7	0	4.2	0
6	5.0	0	0	5.0	0	4.7	0	5.0	5.0	-5.4	-5.9	-10.0	0	0	0
7	0	5.0	5.0	0	3.7	0	0	0	1.0	0	0	0	0	0	09
8	0	0	0	0	0	5.0	0	0	0	0	-6.1	0	5.0	0	0
9	5.0	0	0	0	4.5	0	0	0	0	0	-5.4	5.0	0	5.0	4.9
10	5.0	4.9	5.0	5.0	5.0	0	0	0	4.4	0	5.0	0	5.0	0	0
11	0	5.0	5.0	0.1	5.0	1.3	6.9	0	5.0	0	2.5	0.5	0	0	0
12	5.0	5.0	5.0	5.0	4.1	4.7	-0.4	5.0	4.4	0	2.5	0	0	0	0
13	0	0	0	5.0	2.6	4.1	2.3	0.7	0.1	0	5.0	5.0	0	----	0
14	5.0	0	0	0	0	5.0	2.3	0	5.0	5.0	5.0	5.0	0	0	5.0
15		5.0	3.5	0	2.7		1.4	4.0	1.0	0				0	
16		5.0	5.0	5.0	5.0		8.8	5.0	5.0	5.0				5.0	

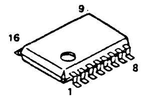
	IC18	IC19	IC20	IC21	IC22	IC23	IC24	IC25	IC26	IC27	IC28	IC29	IC30	IC31	IC32
Pin 1	0.2	0	8.5	5.0	-0.1	0	0	5.0	0	0	8.8	0	5.1	3.9	0
2	5.0	5.0	0	0	0	0	0	5.0	0.2	0.2	0.2	0	5.1	0	0
3	4.9	5.0	0	0	0.3	0	0.9	0	-5.7	5.0	0	0	0	2.9	5.0
4	4.7	0	0	0	4.8	0	4.2	0.1	0	5.0	6.5	0	0	0	5.0
5	2.5	5.0	2.3	0	0.3	0	0.9	4.4	0	0	0	0	----	1.3	5.0
6	3.8	0	0	0	0.1	0	0.1	0.5	0	0	0	0	5.6	1.2	0
7	2.5	5.0	2.3	0	0	0	0	4.5	0	0	3.5	0	0	3.9	0
8	4.5	4.4	9.2	0	0	0.5	0	0	1.3	0	0	0	----	5.0	5.0
9	2.5	0		5.0	4.9	4.9	4.8	4.7	1.3	0	0	0	5.0		0
10	2.4			0	0.2	5.0	0.4	0.4	0	5.0	0	0	0		0
11	0			0	0.3	1.2	47	0	0	5.0	0	3.5	0		5.0
12	4.9			0	0.2	0.4	0	5.0	0	5.0	7.9	0.3	2.2		5.0
13	0			5.0	4.8	0.9	0	0	5.0	0	0	0	5.0		0
14	0			5.0	0	5.0	5.0	4.4	0	0	6.4	3.5	5.0		5.0
15	5.0							0		4.9	0	0.1			
16	0							0		5.0	0	0			
17	0														
18	0														
19	2.5														
20	0														
21	5.0														
22	5.0														
23	0														
24	2.7														
25	1.8														
26	-6.7														
27	2.5														
28	5.0														

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q18	Q19
B	1.9	2.0	3.5	4.7	0.5	1.9	1.9	2.7	1.1	1.4	0.1	1.5	3.1	1.3	8.6	1.1	1.8
C	5.0	3.5	5.0	0.5	5.0	1.7	2.8	5.0	5.0	2.2	1.5	3.1	5.0	5.0	8.8	8.8	6.5
E	1.3	1.4	2.9	5.0	1.2	1.2	1.3	2.1	0.7	0.6	0	0.8	3.4	0.6	9.2	0.5	1.1

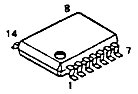
YWCX7930A



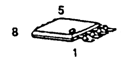
MN74HC153S
MN74HC221S
MN4049BS
MN4050BS
MN4053BS
SN74LS221S



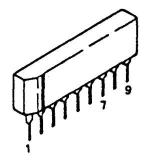
MN74HC00S
MN74HC04S
MN74HC74S
MN74HC86S
MN74HC08S
MN4001BS
MN4071BS



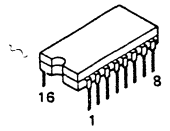
NJM2904M



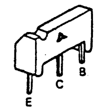
TC5081AP



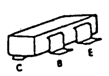
HD14557BP



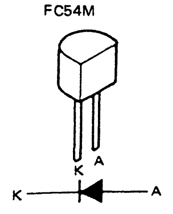
2SB793-RS

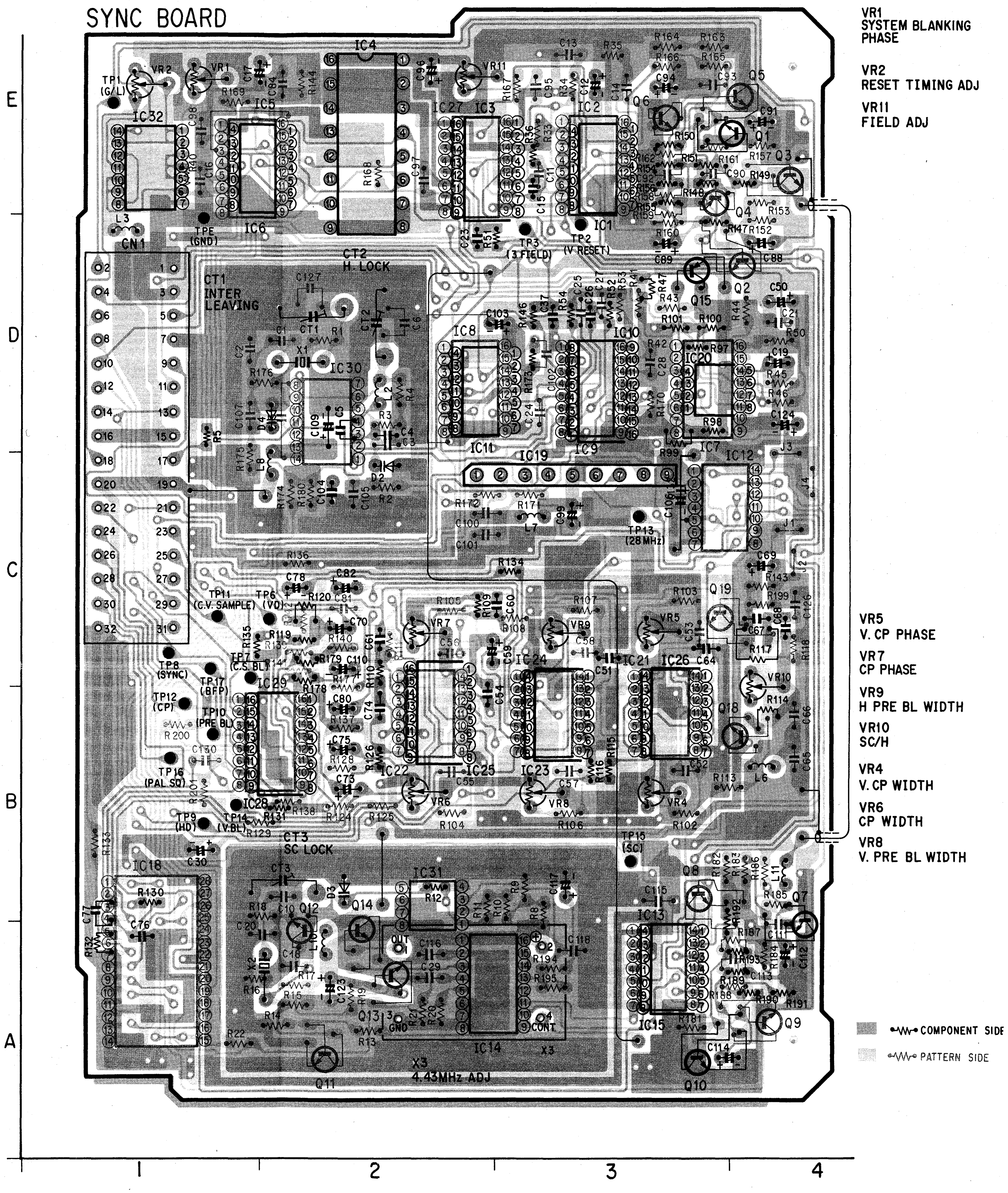


2SD601-QR
2SC2404-CDTW
2SA1022-C



FC54M



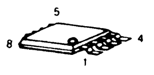

SYNC BOARD
E
D
C
B
A
1
2
3
4
TP1 (G/L)
TPE (GND)
CN1
CT1 INTER LEAVING
CT2 H. LOCK
TP3 (3 FIELD)
TP2 (V RESET)
TP13 (28MHz)
TP11 (C.V. SAMPLE)
TP6 (VD)
TP7 (C.S. BL)
TP8 (SYNC)
TP17 (BFP)
TP12 (CP)
TP10 (PRE BL)
TP16 (PAL SQ)
TP9 (HD)
TP14 (V.BL)
TP15 (SC)
CT3 SC LOCK
X3 4.43MHz ADJ
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
IC11
IC12
IC13
IC14
IC15
IC18
IC19
IC20
IC21
IC22
IC23
IC24
IC25
IC26
IC27
IC28
IC29
IC30
IC31
IC32
VR1
SYSTEM BLANKING PHASE
VR2
RESET TIMING ADJ
VR11
FIELD ADJ
VR5
V. CP PHASE
VR7
CP PHASE
VR9
H PRE BL WIDTH
VR10
SC/H
VR4
V. CP WIDTH
VR6
CP WIDTH
VR8
V. PRE BL WIDTH
COMPONENT SIDE
PATTERN SIDE

IC1	MN74HC04S		E3
IC2	MN74HC221S		E3
IC3	MN74HC221S		E2, E3
IC4	HD14557BP		E2
IC5	MN74HC221S		E1, E2
IC6	MN74HC00S		E1, E2
IC7	MN4053BS		D3
IC8	MN74HC221S		D2
IC9	SN74LS221S		D3
IC10	MN74HC153S		D3
IC11	MN74HC74S		D2, D3
IC12	MN74HC74S		C3, C4
IC13	MN74HC86S		A3
IC14	MN74HC4053S		A2, A3
IC15	MN74HC08S		A3
IC18	YWCX7930A		A1, B1
IC19	TC5081AP		C3
IC20	NJM2904M		D3
IC21	MN4001BS		B3
IC22	MN4001BS		B2
IC23	MN4071BS		B3
IC24	MN4001BS		B3
IC25	MN4049BS		B2
IC26	MN74HC74S		B3
IC27	MN74HC221S		E2
IC28	MN4049BS		B2
IC29	MN4050BS		B1, B2
IC30	MN74HC00S		D2
IC31	NJM2904M		B2
IC32	MN74HC00S		E1
Q1	2SD601-RS	(Y)	E3
Q2	2SD601-RS	(Y)	D3
Q3	2SD601-RS	(Y)	E4
Q4	2SA1022-C	(E)	E3
Q5	2SC2404-CDTW	(U)	E3, E4
Q6	2SC2404-CDTW	(U)	E3
Q7	2SD601-RS	(Y)	A4, B4
Q8	2SD601-RS	(Y)	B3
Q9	2SC2404-CDTW	(U)	A3, A4
Q10	2SC2404-CDTW	(U)	A3
Q11	2SC2404-CDTW	(U)	A2
Q12	2SC2404-CDTW	(U)	A2
Q13	2SC2404-CDTW	(U)	A2
Q14	2SC2404-CDTW	(U)	A2
Q15	2SB793-RS		D3
Q18	2SC2404-CDTW	(U)	B4
Q19	2SC2404-CDTW	(U)	C3, C4
D2	YWFC54M		C2
D3	YWFC54M		B2
D4	YWFC54M		D2

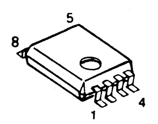
CONDUCTOR VIEW OF AUTO BOARD

IC1	MN1758CVW2	D3	Q14	2SD601-RS	E1
IC2	YWM51957BL	C3	Q15	2SD601-RS	E2
IC3	UPD6142G-101	B3	Q16	2SD601-RS	E2
IC4	AN90B82S	C2	Q17	2SD601-RS	E1
IC5	AN90B82S	C2	Q18	2SD601-RS	E2
IC6	AN90B82S	C2	Q19	2SD601-RS	E1
IC7	AN90B82S	C2	Q20	2SD601-RS	E1
IC8	MN4053BS	E2	Q21	2SD601-RS	E1
IC9	MN4053BS	E2	Q22	2SD601-RS	E1
IC10	MN4053BS	E3	Q23	2SD601-RS	E2
IC11	BA226AF	D3	Q24	2SD601-RS	E2
IC13	YWUPC4062G2	E2	Q25	2SD601-RS	F2
IC14	NJM2903M	E3	Q26	2SB709-Q	E3
IC15	YWUPC4064G2	D2	Q27	2SB709-Q	E3
IC16	YWUPC4064G2	D1	Q28	2SD601-RS	E3
IC17	YWUPC4064G2	A3	Q29	2SD601-RS	F3
IC18	MN4051BS	D2	Q30	2SD601-RS	E3
IC19	MN4051BS	A3	Q31	2SD601-RS	F3
IC20	NJM2903M	A2	Q40	2SD601-RS	C2
Q1	2SB970-QRS	D4	D1	MA151K	C2
Q2	2SD601-RS	C4	D2	MA151WK	B4
Q3	2SD601-RS	B3	D3	MA151WK	C2
Q4	2SD601-RS	B3	D4	MA151K	C2
Q5	2SB709-Q	B3	D5	MA151K	B3
Q6	2SD601-RS	C2	D6	MA151WA	D3
Q11	2SD601-RS	E1	D7	MA151K	B3
Q12	2SD601-RS	D2	D10	MA151K	A2
Q13	2SD601-RS	E1	D11	MA151K	C3

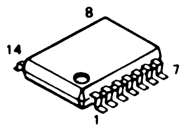
NJM2903M



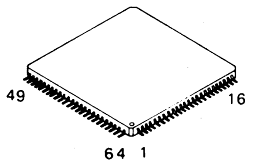
YWUPC4062G2
BA226AF



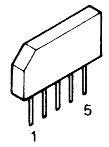
UPC4064G2



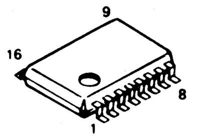
MN1758CVW2



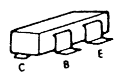
M51957BL



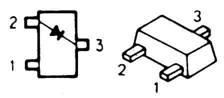
AN90B82S
MN4051BS
MN4053BS



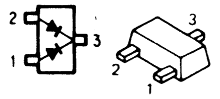
2SB970-QRS
2SD601-QR
2SB709-Q

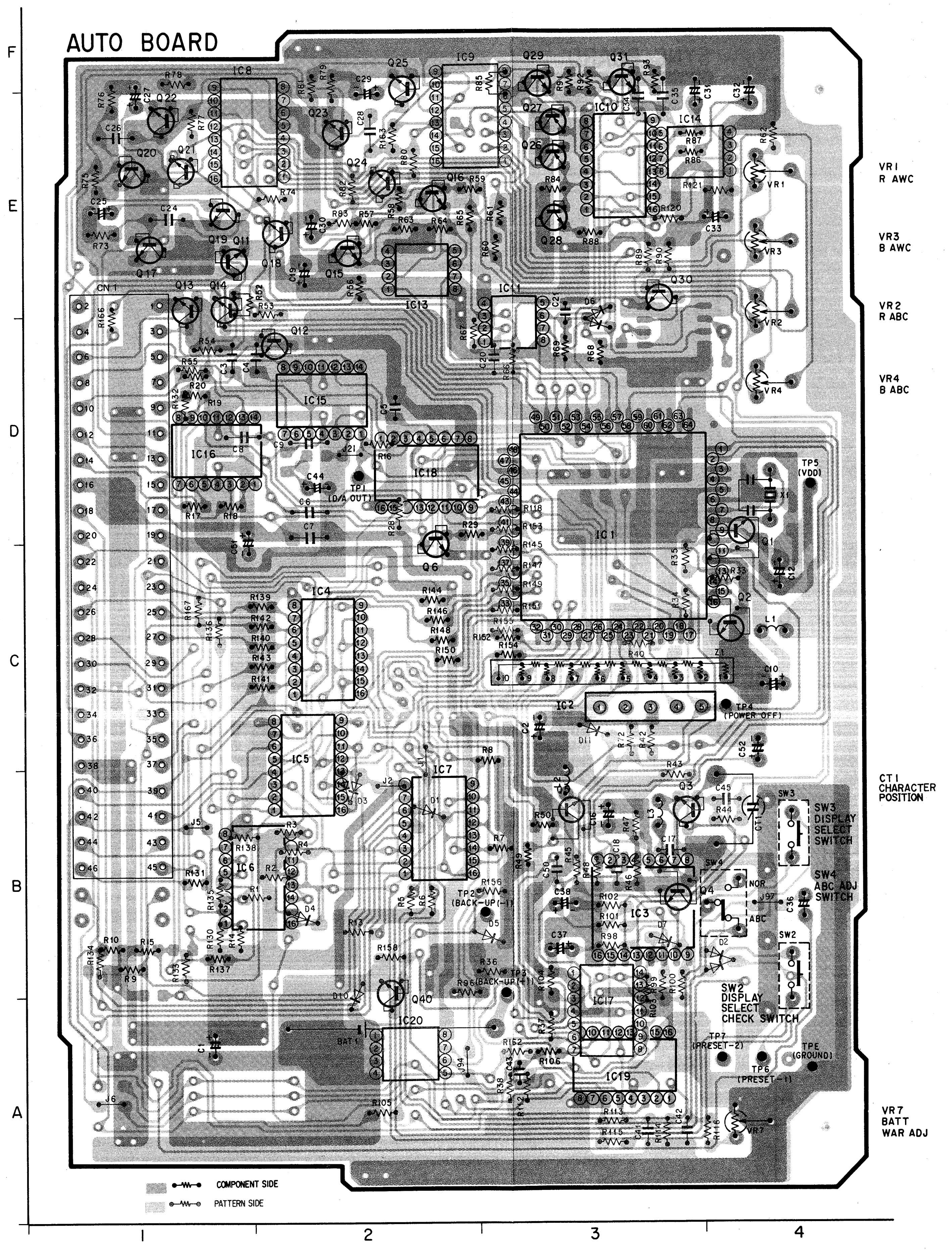


MA151K



MA151WK

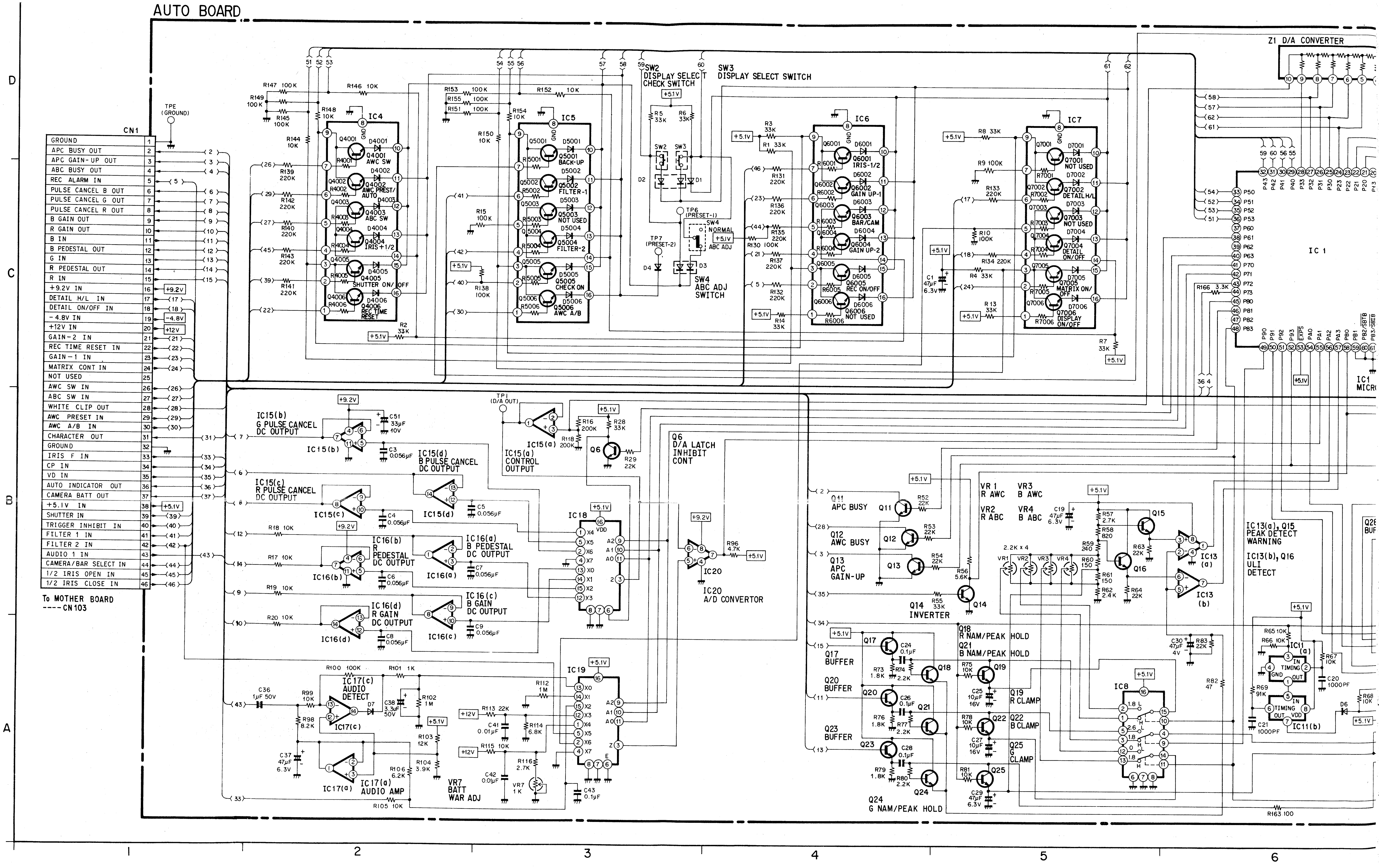



AUTO BOARD
F
E
D
C
B
A
1
2
3
4
CN1
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
IC11
IC13
IC14
IC15
IC16
IC17
IC18
IC19
IC20
TP1 (D/A OUT)
TP2 (BACK-UP(-))
TP3 (BACK-UP(+))
TP4 (POWER OFF)
TP5 (VDD)
TP6 (PRESET-1)
TP7 (PRESET-2)
TPE (GROUND)
BAT1
SW2 DISPLAY SELECT CHECK SWITCH
SW3 DISPLAY SELECT SWITCH
SW4 ABC ADJ SWITCH
NOR
ABC
VR1 R AWC
VR3 B AWC
VR2 R ABC
VR4 B ABC
CT1 CHARACTER POSITION
VR7 BATT WAR ADJ
COMPONENT SIDE
PATTERN SIDE

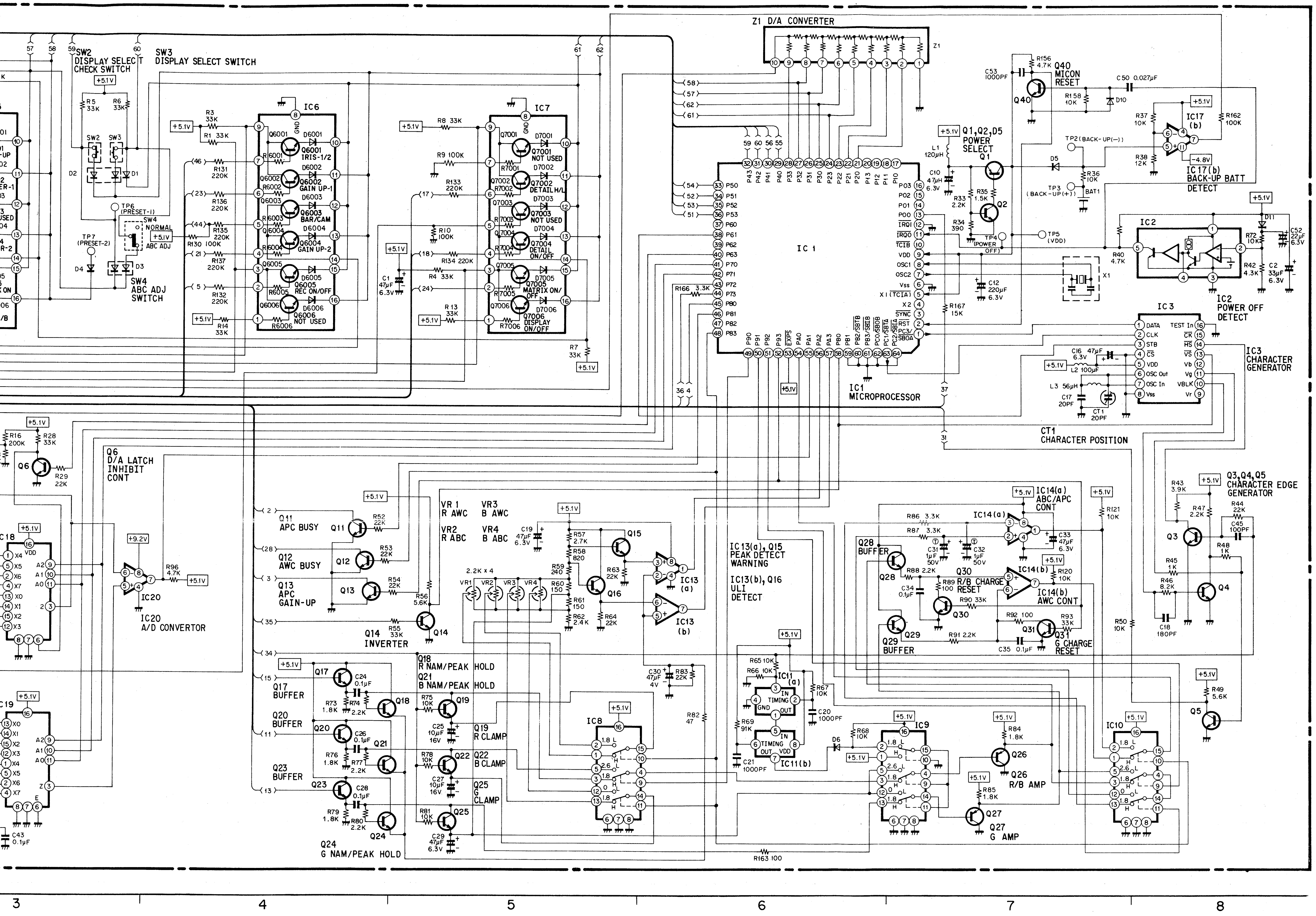
Pin No.	IC1							IC2	IC3	IC4	IC5	IC6
1	0	17	—	33	0.6	49	0	5.1	0	1.6	0	2.2
2	5.0	18	—	34	0.7	50	0	1.3	4.9	0.4	1.6	0.5
3	—	19	—	35	0.7	51	0	0	0	0.8	0.8	0.8
4	—	20	—	36	0.7	52	0	—	0	1.6	0.7	1.7
5	5.0	21	4.8	37	—	53	5.1	5.1	5.8	1.5	0	1.5
6	0	22	4.7	38	0	54	5.1		2.5	1.6	0.7	1.7
7	2.6	23	4.8	39	0	55	4.9		2.5	1.7	4.2	1.6
8	2.3	24	0	40	0	56	4.5		2.9	0	0	0
9	5.0	25	0	41	0.8	57	0.8		—	0.7	0	0.8
10	—	26	4.8	42	4.9	58	4.9		—	4.8	4.8	0
11	5.1	27	4.8	43	0	59	0		0.3	4.9	4.8	0
12	0	28	4.9	44	0	60	0		—	4.8	4.8	0
13	0	29	3.4	45	0	61	0		4.9	4.9	4.9	0
14	—	30	0.8	46	0	62	0		4.8	0.7	0.9	0.8
15	0	31	5.1	47	—	63	4.9		—	4.8	4.8	0
16	5.0	32	4.9	48	0	64	0		0	4.8	4.9	0
	IC7	IC8	IC10	IC13	IC14	IC15	IC16	IC17	IC18	IC19	IC20	
1	2.2	1.6	0	4.4	5.2	3.5	2.5	1.2	2.4	3.3	—	
2	2.3	1.6	5.1	1.1	2.3	3.5	2.5	1.2	2.4	0	—	
3	0.8	1.6	2.3	1.9	1.8	3.6	2.4	1.2	3.5	3.4	—	
4	1.7	1.6	2.3	0	0	9.2	9.2	5.1	0	0	0	
5	0	1.6	2.3	1.1	1.9	2.4	2.4	3.2	0	0	3.4	
6	0	0	0	1.3	1.9	2.5	2.5	2.8	2.4	0	3.4	
7	0	0	0	0.8	5.1	2.5	2.5	4.4	0	0	4.9	
8	0	0	0	5.1		2.5	2.5	—	0	0	9.2	
9	3.8	0	0			2.5	2.5	—	0	0		
10	0	0	0			2.4	2.4	—	4.9	4.9		
11	0	0	0			0	0	–4.8	0	0		
12	0	1.6	2.3			2.4	2.4	1.2	2.4	3.2		
13	0	1.6	1.9			2.5	2.5	1.2	2.4	1.2		
14	0.7	1.6	2.3			2.5	2.5	1.4	2.4	0		
15	0	1.6	5.1						2.4	3.5		
16	0	5.1	5.1						5.1	5.1		

	Q1	Q2	Q3	Q4	Q5	Q6	Q11	Q12	Q13	Q14	Q15	Q16
B	4.3	0.6	0	0	1.4	0	0	0	0	0	2.5	1.9
C	5.0	0	4.8	2.5	0	5.0	9.1	8.7	9.1	4.9	5.1	5.1
E	5.0	0	0	0	2.0	0	0	0	0	0	1.9	1.3
	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28
B	2.2	1.6	0.2	2.2	1.6	0.2	2.2	1.6	0.2	1.6	1.6	2.3
C	5.1	5.1	1.6	5.1	5.1	1.6	5.1	5.1	1.6	0	0	5.1
E	1.6	1.1	1.6	1.6	1.1	1.6	1.6	1.1	1.6	2.3	2.3	2.1
	Q29	Q30	Q31	Q40								
B	2.3	—	0	0								
C	5.1	2.0	1.9	5.0								
E	2.0	0	0	0								

SCHEMATIC DIAGRAM OF AUTO BOARD

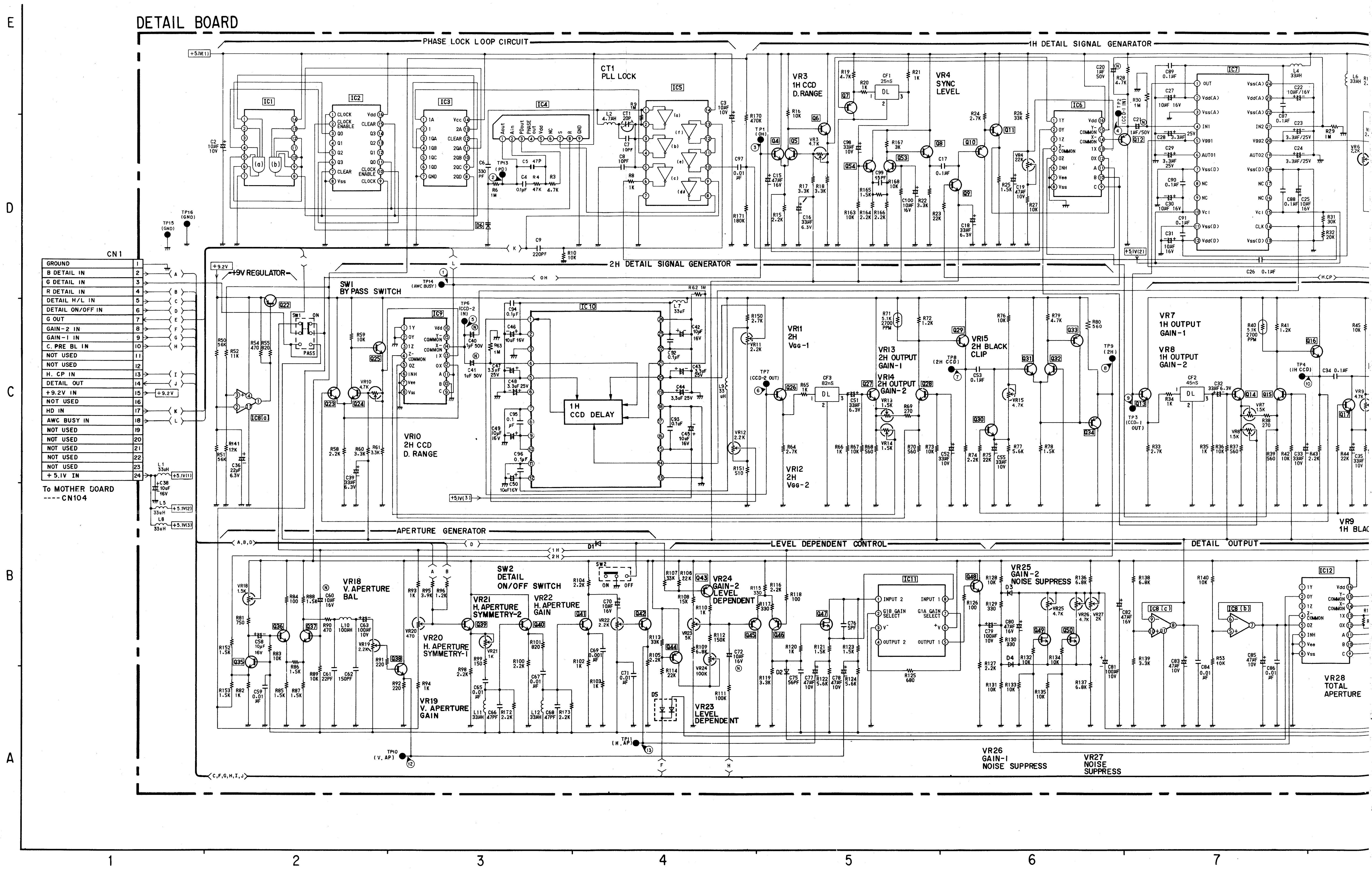

AUTO BOARD
CN1
GROUND 1
APC BUSY OUT 2
APC GAIN-UP OUT 3
ABC BUSY OUT 4
REC ALARM IN 5
PULSE CANCEL B OUT 6
PULSE CANCEL G OUT 7
PULSE CANCEL R OUT 8
B GAIN OUT 9
R GAIN OUT 10
B IN 11
B PEDESTAL OUT 12
G IN 13
R PEDESTAL OUT 14
R IN 15
+9.2V IN 16
DETAIL H/L IN 17
DETAIL ON/OFF IN 18
-4.8V IN 19
+12V IN 20
GAIN-2 IN 21
REC TIME RESET IN 22
GAIN-1 IN 23
MATRIX CONT IN 24
NOT USED 25
AWC SW IN 26
ABC SW IN 27
WHITE CLIP OUT 28
AWC PRESET IN 29
AWC A/B IN 30
CHARACTER OUT 31
GROUND 32
IRIS F IN 33
CP IN 34
VD IN 35
AUTO INDICATOR OUT 36
CAMERA BATT OUT 37
+5.1V IN 38
SHUTTER IN 39
TRIGGER INHIBIT IN 40
FILTER 1 IN 41
FILTER 2 IN 42
AUDIO 1 IN 43
CAMERA/BAR SELECT IN 44
1/2 IRIS OPEN IN 45
1/2 IRIS CLOSE IN 46
To MOTHER BOARD
----CN 103
TPE (GROUND)
IC4
Q4001 AWC SW
Q4002 AWC PREST/AUTO
Q4003 ABC SW
Q4004 IRIS+1/2
Q4005 SHUTTER ON/OFF
Q4006 REC TIME RESET
IC5
Q5001 BACK-UP
Q5002 FILTER-1
Q5003 NOT USED
Q5004 FILTER-2
Q5005 CHECK ON
Q5006 AWC A/B
SW2 DISPLAY SELECT CHECK SWITCH
SW3 DISPLAY SELECT SWITCH
TP6 (PRESET-1)
TP7 (PRESET-2)
SW4 NORMAL ABC ADJ
SW4 ABC ADJ SWITCH
IC6
Q6001 IRIS-1/2
Q6002 GAIN UP-1
Q6003 BAR/CAM
Q6004 GAIN UP-2
Q6005 REC ON/OFF
Q6006 NOT USED
IC7
Q7001 NOT USED
Q7002 DETAIL H/L
Q7003 NOT USED
Q7004 DETAIL ON/OFF
Q7005 MATRIX ON/OFF
Q7006 DISPLAY ON/OFF
Z1 D/A CONVERTER
IC 1
IC1 MICRO
IC15(b) G PULSE CANCEL DC OUTPUT
IC15(d) B PULSE CANCEL DC OUTPUT
IC15(c) R PULSE CANCEL DC OUTPUT
IC16(b) R PEDESTAL DC OUTPUT
IC16(a) B PEDESTAL DC OUTPUT
IC16(d) R GAIN DC OUTPUT
IC16(c) B GAIN DC OUTPUT
TP1 (D/A OUT)
IC15(a) CONTROL OUTPUT
Q6 D/A LATCH INHIBIT CONT
IC18
IC20
IC20 A/D CONVERTOR
IC17(c) AUDIO DETECT
IC17(a) AUDIO AMP
IC19
VR7 BATT WAR ADJ
Q11 APC BUSY
Q12 AWC BUSY
Q13 APC GAIN-UP
Q14 INVERTER
VR1 R AWC
VR3 B AWC
VR2 R ABC
VR4 B ABC
IC13(a)
IC13(b)
Q15
Q16
IC13(a), Q15 PEAK DETECT WARNING
IC13(b), Q16 ULI DETECT
Q17 BUFFER
Q18 R NAM/PEAK HOLD
Q21 B NAM/PEAK HOLD
Q19 R CLAMP
Q20 BUFFER
Q22 B CLAMP
Q23 BUFFER
Q25 G CLAMP
Q24 G NAM/PEAK HOLD
IC8
IC11(a)
IC11(b)
1 2 3 4 5 6
A B C D

SCHEMATIC DIAGRAM OF AUTO BOARD

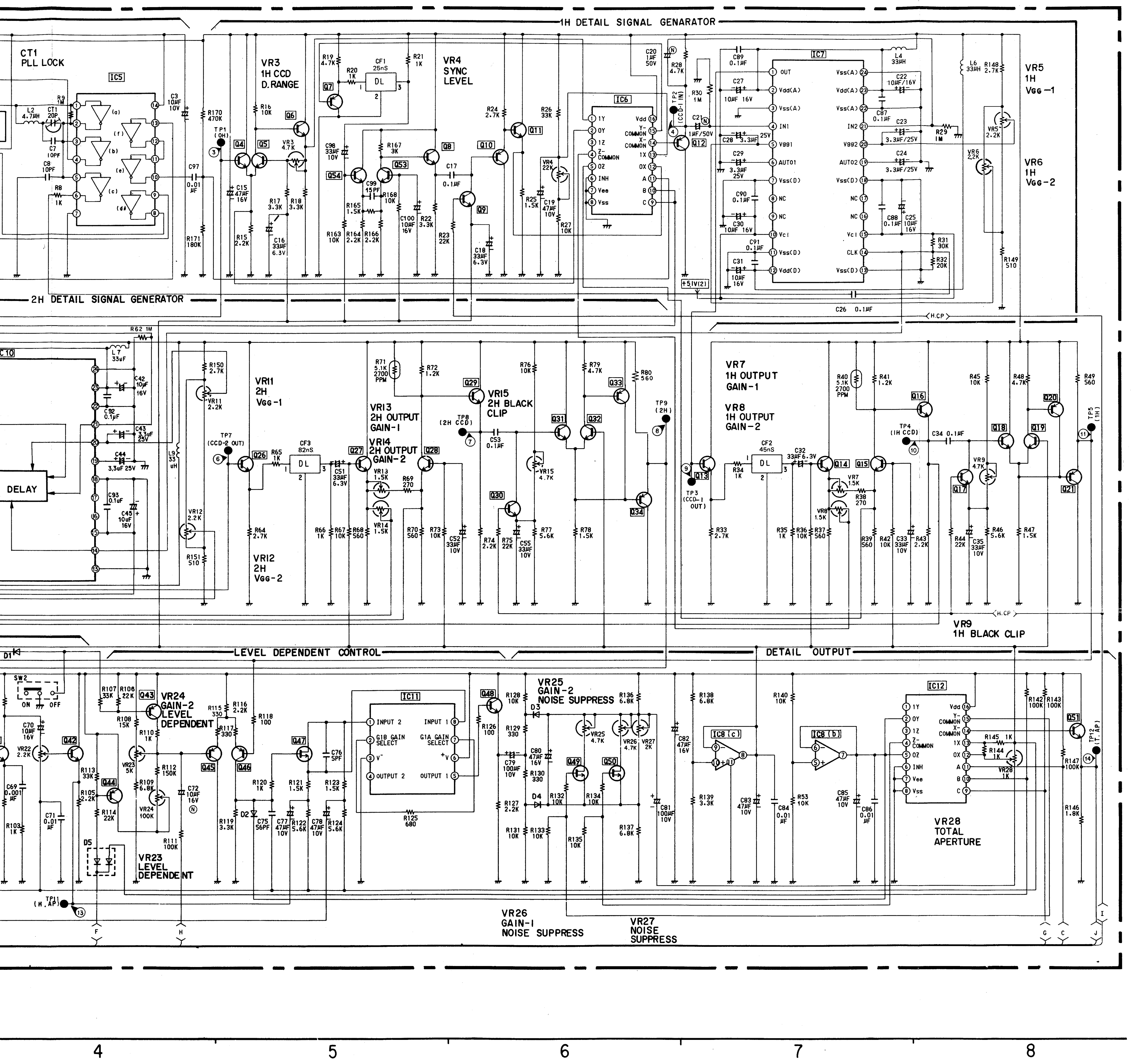

Z1 D/A CONVERTER
SW2 DISPLAY SELECT CHECK SWITCH
SW3 DISPLAY SELECT SWITCH
SW4 ABC ADJ SWITCH
SW4 NORMAL ABC ADJ
TP6 (PRESET-1)
TP7 (PRESET-2)
IC6
IC7
Q6001 IRIS-1/2
Q6002 GAIN UP-1
Q6003 BAR/CAM
Q6004 GAIN UP-2
Q6005 REC ON/OFF
Q6006 NOT USED
Q7001 NOT USED
Q7002 DETAIL H/L
Q7003 NOT USED
Q7004 DETAIL ON/OFF
Q7005 MATRIX ON/OFF
Q7006 DISPLAY ON/OFF
IC1 MICROPROCESSOR
Q40 MICON RESET
Q1,Q2,D5 POWER SELECT
IC17(b) BACK-UP BATT DETECT
TP2 (BACK-UP(−))
TP3 (BACK-UP(+))
TP4 (POWER OFF)
TP5 (VDD)
BATT1
X1
IC2
IC2 POWER OFF DETECT
IC3
IC3 CHARACTER GENERATOR
CT1 CHARACTER POSITION
Q3,Q4,Q5 CHARACTER EDGE GENERATOR
Q6 D/A LATCH INHIBIT CONT
IC18
IC19
IC20
IC20 A/D CONVERTOR
Q11 APC BUSY
Q12 AWC BUSY
Q13 APC GAIN-UP
Q14 INVERTER
VR1 R AWC
VR2 R ABC
VR3 B AWC
VR4 B ABC
IC13(a), Q15 PEAK DETECT WARNING
IC13(b), Q16 ULI DETECT
IC14(a) ABC/APC CONT
IC14(b) AWC CONT
Q28 BUFFER
Q29 BUFFER
Q30 R/B CHARGE RESET
Q31 G CHARGE RESET
Q17 BUFFER
Q20 BUFFER
Q23 BUFFER
Q18 R NAM/PEAK HOLD
Q21 B NAM/PEAK HOLD
Q24 G NAM/PEAK HOLD
Q19 R CLAMP
Q22 B CLAMP
Q25 G CLAMP
IC8
IC9
IC10
IC11(a)
IC11(b)
Q26 R/B AMP
Q27 G AMP
+5.1V
+9.2V
−4.8V
3
4
5
6
7
8

IC1	MN1758CVW2	C6
IC2	YWM51957BL	C8
IC3	UPD6142G-101	C8
IC4	AN90B82S	C2
IC5	AN90B82S	C3
IC6	AN90B82S	C4
IC7	AN90B82S	C5
IC8	MN4053BS	A5
IC9	MN4053BS	A7
IC10	MN4053BS	A7
IC11	BA226AF	A6
IC13	YWUPC4062G2	B6
IC14	NJM2903M	B7
IC15	YWUPC4064G2	B2, B3
IC16	YWUPC4064G2	A2, B2
IC17	YWUPC4064G2	A2
IC18	MN4051BS	B3
IC19	MN4051BS	A3
IC20	NJM2903M	B3
Q1	2SB970-QRS	C7
Q2	2SD601-RS	C7
Q3	2SD601-RS	B8
Q4	2SD601-RS	B8
Q5	2SB709-Q	A8
Q6	2SD601-RS	B3
Q11	2SD601-RS	B4
Q12	2SD601-RS	B4
Q13	2SD601-RS	B4
Q14	2SD601-RS	B5
Q15	2SD601-RS	B5
Q16	2SD601-RS	B5
Q17	2SD601-RS	A4
Q18	2SD601-RS	A4
Q19	2SD601-RS	A5
Q20	2SD601-RS	A4
Q21	2SD601-RS	A4
Q22	2SD601-RS	A5
Q23	2SD601-RS	A4
Q24	2SD601-RS	A4
Q25	2SD601-RS	A5
Q26	2SB709-Q	A7
Q27	2SB709-Q	A7
Q28	2SD601-RS	B7
Q29	2SD601-RS	B7
Q30	2SD601-RS	B7
Q31	2SD601-RS	B7
Q40	2SD601-RS	D7
D1	MA151K	C3
D2	MA151WK	C3
D3	MA151WK	C3
D4	MA151K	C3
D5	MA151K	C7
D6	MA151WA	A6
D7	MA151K	A2
D10	MA151K	D7

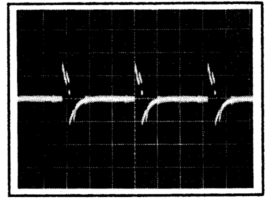
SCHEMATIC DIAGRAM OF DETAIL BOARD


DETAIL BOARD
PHASE LOCK LOOP CIRCUIT
1H DETAIL SIGNAL GENARATOR
2H DETAIL SIGNAL GENERATOR
+9V REGULATOR
SW1 BY PASS SWITCH
APERTURE GENERATOR
LEVEL DEPENDENT CONTROL
DETAIL OUTPUT
CT1 PLL LOCK
VR3 1H CCD D.RANGE
VR4 SYNC LEVEL
VR10 2H CCD D. RANGE
1H CCD DELAY
VR11 2H Vgg-1
VR12 2H Vgg-2
VR13 2H OUTPUT GAIN-1
VR14 2H OUTPUT GAIN-2
VR15 2H BLACK CLIP
VR7 1H OUTPUT GAIN-1
VR8 1H OUTPUT GAIN-2
VR9 1H BLAC
VR18 V. APERTURE BAL
VR19 V. APERTURE GAIN
VR20 H. APERTURE SYMMETRY-1
VR21 H. APERTURE SYMMETRY-2
VR22 H. APERTURE GAIN
SW2 DETAIL ON/OFF SWITCH
VR24 GAIN-2 LEVEL DEPENDENT
VR23 LEVEL DEPENDENT
VR25 GAIN-2 NOISE SUPPRESS
VR26 GAIN-1 NOISE SUPPRESS
VR27 NOISE SUPPRESS
VR28 TOTAL APERTURE
CN1
1 GROUND
2 B DETAIL IN
3 G DETAIL IN
4 R DETAIL IN
5 DETAIL H/L IN
6 DETAIL ON/OFF IN
7 G OUT
8 GAIN-2 IN
9 GAIN-1 IN
10 C. PRE BL IN
11 NOT USED
12 NOT USED
13 H. CP IN
14 DETAIL OUT
15 +9.2V IN
16 NOT USED
17 HD IN
18 AWC BUSY IN
19 NOT USED
20 NOT USED
21 NOT USED
22 NOT USED
23 NOT USED
24 +5.1V IN
To MOTHER BOARD ----CN104
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
IC11
IC12
TP1 (OH)
TP3 (CCD-1 OUT)
TP4 (1H CCD)
TP6 (CCD-2 IN)
TP7 (CCD-2 OUT)
TP8 (2H CCD)
TP9 (2H)
TP10 (V. AP)
TP11 (H. AP)
TP14 (AWC BUSY)
TP15 (GND)
TP16 (GND)
E
D
C
B
A
1
2
3
4
5
6
7

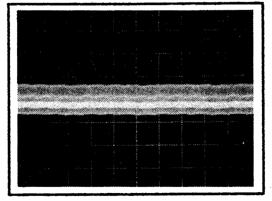
SCHEMATIC DIAGRAM OF DETAIL BOARD


1H DETAIL SIGNAL GENARATOR
2H DETAIL SIGNAL GENERATOR
LEVEL DEPENDENT CONTROL
DETAIL OUTPUT
CT1
PLL LOCK
IC5
IC6
IC7
IC8(c)
IC8(b)
IC10
IC11
IC12
DELAY
VR3
1H CCD
D.RANGE
VR4
SYNC
LEVEL
VR5
1H
VGG -1
VR6
1H
VGG -2
VR11
2H
VGG -1
VR12
2H
VGG -2
VR13
2H OUTPUT
GAIN-1
VR14
2H OUTPUT
GAIN-2
VR15
2H BLACK
CLIP
VR7
1H OUTPUT
GAIN-1
VR8
1H OUTPUT
GAIN-2
VR9
1H BLACK CLIP
VR24
GAIN-2
LEVEL
DEPENDENT
VR23
LEVEL
DEPENDENT
VR25
GAIN-2
NOISE SUPPRESS
VR26
GAIN-1
NOISE SUPPRESS
VR27
NOISE
SUPPRESS
VR28
TOTAL
APERTURE
SW2
ON
OFF
TP1 (OH)
TP2 (CCD-1 IN)
TP3 (CCD-1 OUT)
TP4 (1H CCD)
TP5 (1H)
TP7 (CCD-2 OUT)
TP8 (2H CCD)
TP9 (2H)
TP11 (H.AP)
TP12 (T.AP)
+5V(2)
H.CP
F
H
G
C
J
I
4
5
6
7
8

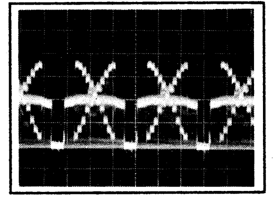
1. 0.2V/DIV, 20μs/DIV



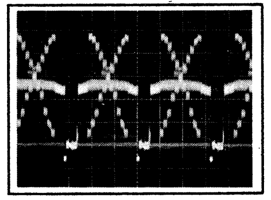
2. 0.2V/DIV, 20μs/DIV



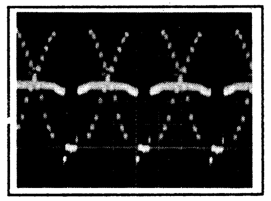
3. 0.2V/DIV, 20μs/DIV



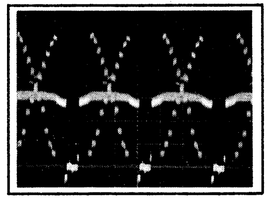
4. 0.2V/DIV, 20μs/DIV



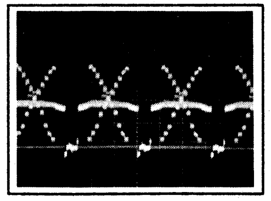
5. 0.2V/DIV, 20us/DIV



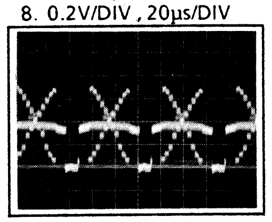
6. 0.2V/DIV, 20μs/DIV



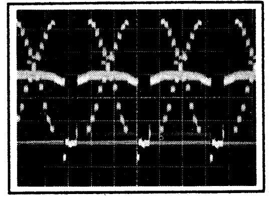
7. 0.2V/DIV, 20μs/DIV



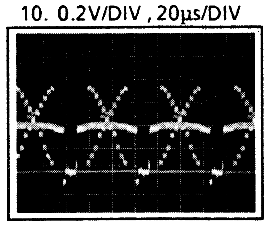
8. 0.2V/DIV, 20μs/DIV



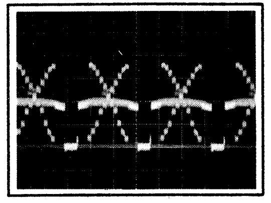
9. 0.2V/DIV, 20μs/DIV



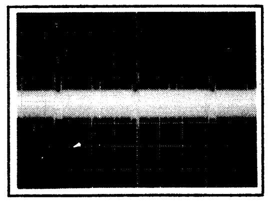
10. 0.2V/DIV, 20μs/DIV



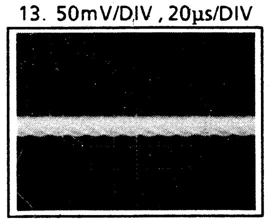
11. 0.2V/DIV, 20μs/DIV



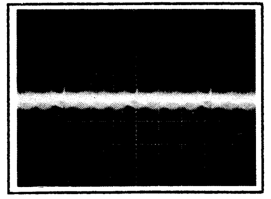
12. 50mV/DIV. 5m/DIV



13. 50mV/DIV, 20μs/DIV



14. 0.1V/DIV, 20μs/DIV



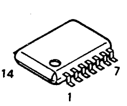
IC1	MN74HC21S	D2
IC2	MN74HC4520S	D2
IC3	MN74HC393S	D3
IC4	TC5081AP	D3
IC5	MN74HC04S	D4
IC6	MN4053BS	D6
IC7	CXL1004P	D7
IC8	NJM2902M	C2
IC9	MN4053BS	C3
IC10	CXL1004P	C4
IC11	NJM592M8	B5
IC12	MN4053BS	B8
Q4	2SD601-RS	D5
Q5	2SC2404-CDTW	D5
Q6	2SC2404-CDTW	D5
Q7	2SB709-Q	E5
Q8	2SD601-RS	D5
Q9	2SC2404-CDTW	D6
Q10	2SB709-Q	D6
Q11	2SD601-RS	D6
Q12	2SB709-Q	D7
Q13	2SD601-RS	C7
Q14	2SD601-RS	C7
Q15	2SD601-RS	C7
Q16	2SD601-RS	C8
Q17	2SC2404-CDTW	C8
Q18	2SC2404-CDTW	C8
Q19	2SC2404-CDTW	C8
Q20	2SA1022-C	C8
Q21	2SB709-Q	C8
Q22	2SB793-RS	C2
Q23	2SD601-RS	C2
Q24	2SC2404-CDTW	C2
Q25	2SC2404-CDTW	C2
Q26	2SD601-RS	C5
Q27	2SD601-RS	C5
Q28	2SD601-RS	C5
Q29	2SD601-RS	C6
Q30	2SC2404-CDTW	C6
Q31	2SC2404-CDTW	C6
Q32	2SC2404-CDTW	C6
Q33	2SA1022-C	C6
Q34	2SB709-Q	C6
Q35	2SD601-RS	B2
Q36	2SD601-RS	B2
Q37	2SD601-RS	B2
Q38	2SD601-RS	B3
Q39	2SD601-RS	B3
Q40	2SD601-RS	B3
Q41	2SD601-RS	B4
Q42	2SD601-RS	B4
Q43	2SB709-Q	B4
Q44	2SB709-Q	B4
Q45	2SB709-Q	B4
Q46	2SB709-Q	B5
Q47	2SK198-Q	B5
Q48	2SD601-RS	B6
Q49	2SK198-Q	B6
Q50	2SK198-Q	B6
Q51	2SD601-RS	B8
Q53	2SC2404-CDTW	D5
Q54	2SD601-RS	D5
D1	MA151K	B4
D2	MA151K	A5
D3	1SS97-2	B6
D4	1SS97-2	B6
D5	MA151WK	A4
D6	MA328	D3

CONDUCTOR VIEW OF DETAIL BOARD

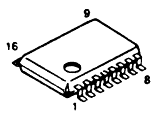
Pin No.	IC1	IC2	IC3	IC4	IC5	IC6	IC7	IC8	IC9	IC10	IC11	IC12
1	2.5	0	2.2	2.5	2.4	2.2	2.9	6.5	—	2.8	2.9	—
2	—	2.5	0	2.4	2.4	1.8	8.9	4.6	—	8.9	2.2	4.6
3	—	—	—	2.4	2.4	—	—	4.6	—	0	0	—
4	1.1	—	2.3	—	2.2	2.1	5.0	9.2	2.1	4.8	—	0
5	0.5	1.1	—	5.1	2.4	2.1	1.7	4.5	2.1	2.2	6.7	4.6
6	0	0.8	—	—	2.2	—	4.9	4.5	—	4.7	8.9	0
7	0	5.1	0	4.5	0	—	—	4.5	—	0	2.2	0
8	5.1	0	2.5	0.5	4.5	—	—	2.9	—	—	2.9	0
9	0	0	2.5	0	0.3	—	—	2.9	—	—		8.4
10	0	0.8	—		0	8.7	5.0	2.9	—	5.0		8.7
11	—	0.5	—		4.9	2.4	—	0	8.7	0		0
12	0	—	0		4.9	3.0	8.9	1.2	3.9	8.9		2.9
13	—	—	2.3		0	2.8	—	1.2	5.2	0		2.9
14	5.1	—	5.1		5.1	3.0	2.0	8,1	5.2	2.0		2.9
15		5.1				—	5.0		—	5.0		0
16		5.1				—	—		—	—		8.9
17							—			—		
18							—			0		
19							4.9			4.8		
20							1.7			2.1		
21							5.0			4.9		
22							0			0		
23							8.9			8.9		
24							0			—		

	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
B	2.4	2.5	2.9	2.2	6.3	0.3	3.0	—	3.0	2.9	2.8	2.8
C	8.9	2.9	8.9	—	8.9	3.0	—	8.9	—	8.9	8.9	5.2
E	1.8	1.8	2.2	2.8	5.7	2.9	3.6	3.0	3.6	2.3	2.1	2.1
	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27
B	5.1	0.3	3.0	2.9	8.7	2.3	8.5	4.5	4.6	5.9	2.8	2.8
C	8.9	3.0	8.9	8.7	2.3	—	8.9	8.9	5.9	8.9	8.9	8.9
E	4.5	3.0	2.3	2.3	8.9	2.9	9.2	3.9	3.9	5.2	2.2	2.2
	Q28	Q29	Q30	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39
B	2.8	5.2	0.3	3.0	2.9	8.7	2.3	2.9	2.8	2.8	2.8	2.5
C	5.2	8.9	3.0	8.9	8.7	2.3	—	5.5	8.7	6.7	8.9	8.9
E	2.1	4.6	3.0	2.3	2.7	8.9	2.9	2.2	2.2	2.2	2.2	1.9
	Q40	Q41	Q42	Q43	Q44	Q45	Q46	Q48	Q51	Q53	Q54	
B	2.9	2.9	2.9	8.6	8.8	2.8	2.9	6.7	2.9	2.8	2.8	
C	8.9	4.0	8.9	2.8	2.7	—	2.9	8.9	8.9	6.3	8.9	
E	2.3	2.2	2.3	8.8	8.9	3.4	3.6	6.0	2.2	2.1	2.2	
	Q47	Q49	Q50									
G	2.9	0	0									
D	2.9	4.9	4.9									
S	2.9	3.9	3.9									

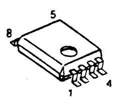
MN74HC393S
MN74HC21S
MN74HC04S
NJM2902M



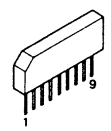
MN74HC4520S
MN4053BS



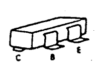
NJM592M8



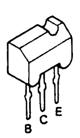
TC5081AP



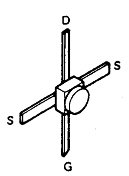
2SA1022-C
2SD601-RS
2SC2404-CDTW
2SB709-Q



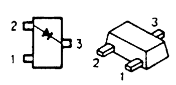
2SB793-RS



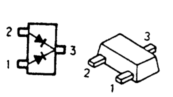
2SK198-Q



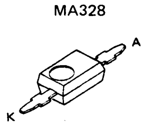
MA151K



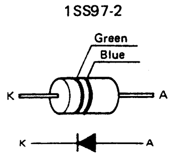
MA151WK



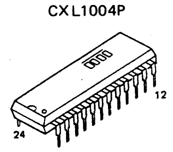
MA328

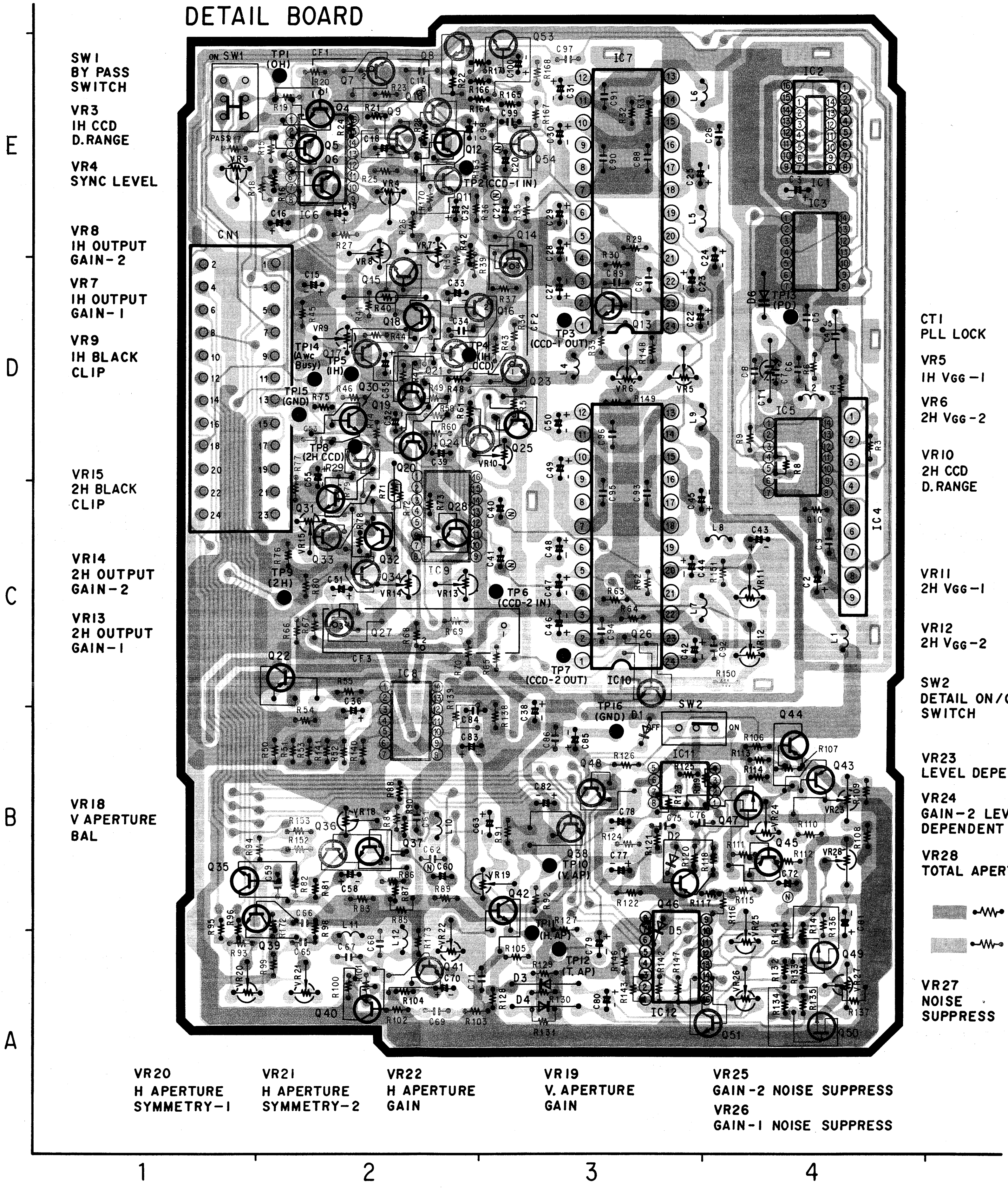


1SS97-2


Green
Blue
K
A
K
A

CXL1004P




DETAIL BOARD
E
D
C
B
A
1
2
3
4
ON SW1
PASS
TP1 (OH)
TP2 (CCD-1 IN)
TP3 (CCD-1 OUT)
TP4 (1H CCD)
TP5 (1H)
TP6 (CCD-2 IN)
TP7 (CCD-2 OUT)
TP8 (2H CCD)
TP9 (2H)
TP10 (V. AP)
TP11 (H. AP)
TP12 (T. AP)
TP13 (PD)
TP14 (Awc Busy)
TP15 (GND)
TP16 (GND)
CN1
CF1
CF2
CF3
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
IC11
IC12
SW2
OFF
ON

SW1
BY PASS
SWITCH

VR3
1H CCD
D. RANGE

VR4
SYNC LEVEL

VR8
1H OUTPUT
GAIN-2

VR7
1H OUTPUT
GAIN-1

VR9
1H BLACK
CLIP

VR15
2H BLACK
CLIP

VR14
2H OUTPUT
GAIN-2

VR13
2H OUTPUT
GAIN-1

VR18
V APERTURE
BAL

VR20
H APERTURE
SYMMETRY-1

VR21
H APERTURE
SYMMETRY-2

VR22
H APERTURE
GAIN

VR19
V. APERTURE
GAIN

VR25
GAIN-2 NOISE SUPPRESS

VR26
GAIN-1 NOISE SUPPRESS

CT1
PLL LOCK

VR5
1H VGG-1

VR6
2H VGG-2

VR10
2H CCD
D. RANGE

VR11
2H VGG-1

VR12
2H VGG-2

SW2
DETAIL ON/OFF
SWITCH

VR23
LEVEL DEPENDENT

VR24
GAIN-2 LEVEL
DEPENDENT

VR28
TOTAL APERTURE

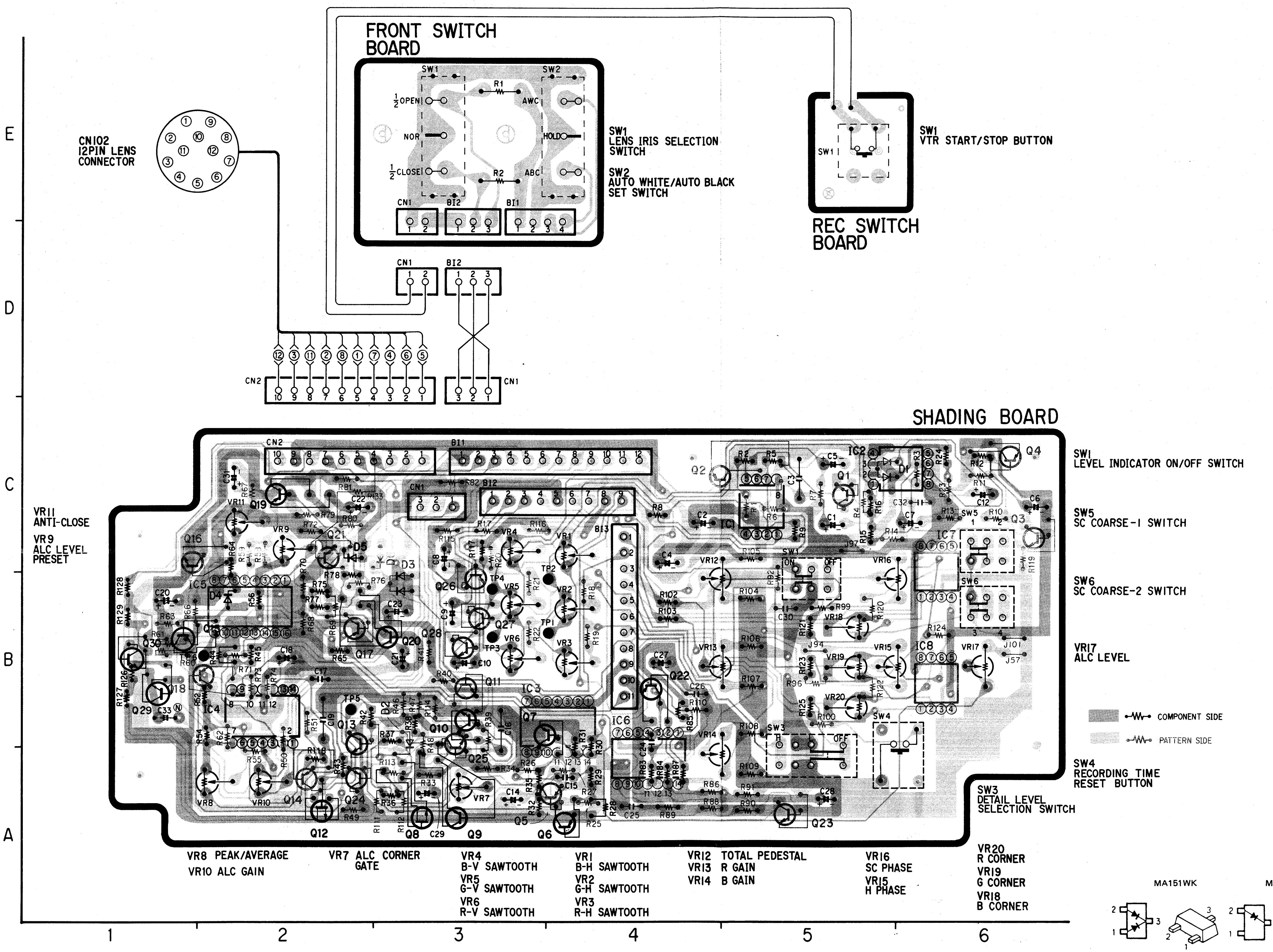
VR27
NOISE
SUPPRESS

▨ -W- COMPONENT SIDE

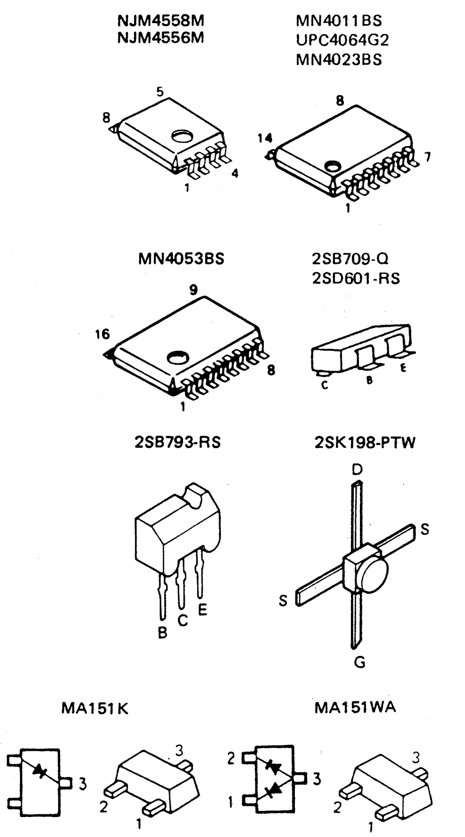
▨ -W- PATTERN SIDE

IC1	MN74HC21S	E4
IC2	MN74HC4520S	E4
IC3	MN74HC393S	E4
IC4	TC5081AP	C4
IC5	MN74HC04S	D4
IC6	MN4053BS	E2
IC7	CXL1004P	E3
IC8	NJM2902M	B2
IC9	MN4053BS	C2
IC10	CXL1004P	C3
IC11	NJM592M8	B3
IC12	MN4053BS	A3
Q4	2SD601-RS	E2
Q5	2SC2404-CDTW	E2
Q6	2SC2404-CDTW	E2
Q7	2SB709-Q	E2
Q8	2SD601-RS	E2
Q9	2SC2404-CDTW	E2
Q10	2SB709-Q	E2
Q11	2SD601-RS	E2
Q12	2SB709-Q	E2
Q13	2SD601-RS	E3
Q14	2SD601-RS	E3
Q15	2SD601-RS	D2
Q16	2SD601-RS	D2
Q17	2SC2404-CDTW	D2
Q18	2SC2404-CDTW	D2
Q19	2SC2404-CDTW	D2
Q20	2SA1022-C	D2
Q21	2SB709-Q	D2
Q22	2SB793-RS	C1
Q23	2SD601-RS	D3
Q24	2SC2404-CDTW	D2
Q25	2SC2404-CDTW	D3
Q26	2SD601-RS	C3
Q27	2SD601-RS	C2
Q28	2SD601-RS	C2
Q29	2SD601-RS	D2
Q30	2SC2404-CDTW	D2
Q31	2SC2404-CDTW	C2
Q32	2SC2404-CDTW	C2
Q33	2SA1022-C	C2
Q34	2SB709-Q	C2
Q35	2SD601-RS	B1
Q36	2SD601-RS	B2
Q37	2SD601-RS	B2
Q38	2SD601-RS	B3
Q39	2SD601-RS	B1
Q40	2SD601-RS	A2
Q41	2SD601-RS	A2
Q42	2SD601-RS	B2
Q43	2SB709-Q	B4
Q44	2SB709-Q	B4
Q45	2SB709-Q	B4
Q46	2SB709-Q	B3
Q47	2SK198-Q	B3
Q48	2SD601-RS	B3
Q49	2SK198-Q	A4
Q50	2SK198-Q	A4
Q51	2SD601-RS	A3
Q53	2SC2404-CDTW	E2
Q54	2SD601-RS	E3
D1	MA151K	B3
D2	MA151K	B3
D3	1SS97-2	A3
D4	1SS97-2	A3
D5	MA151WK	A3
D6	MA328	D4

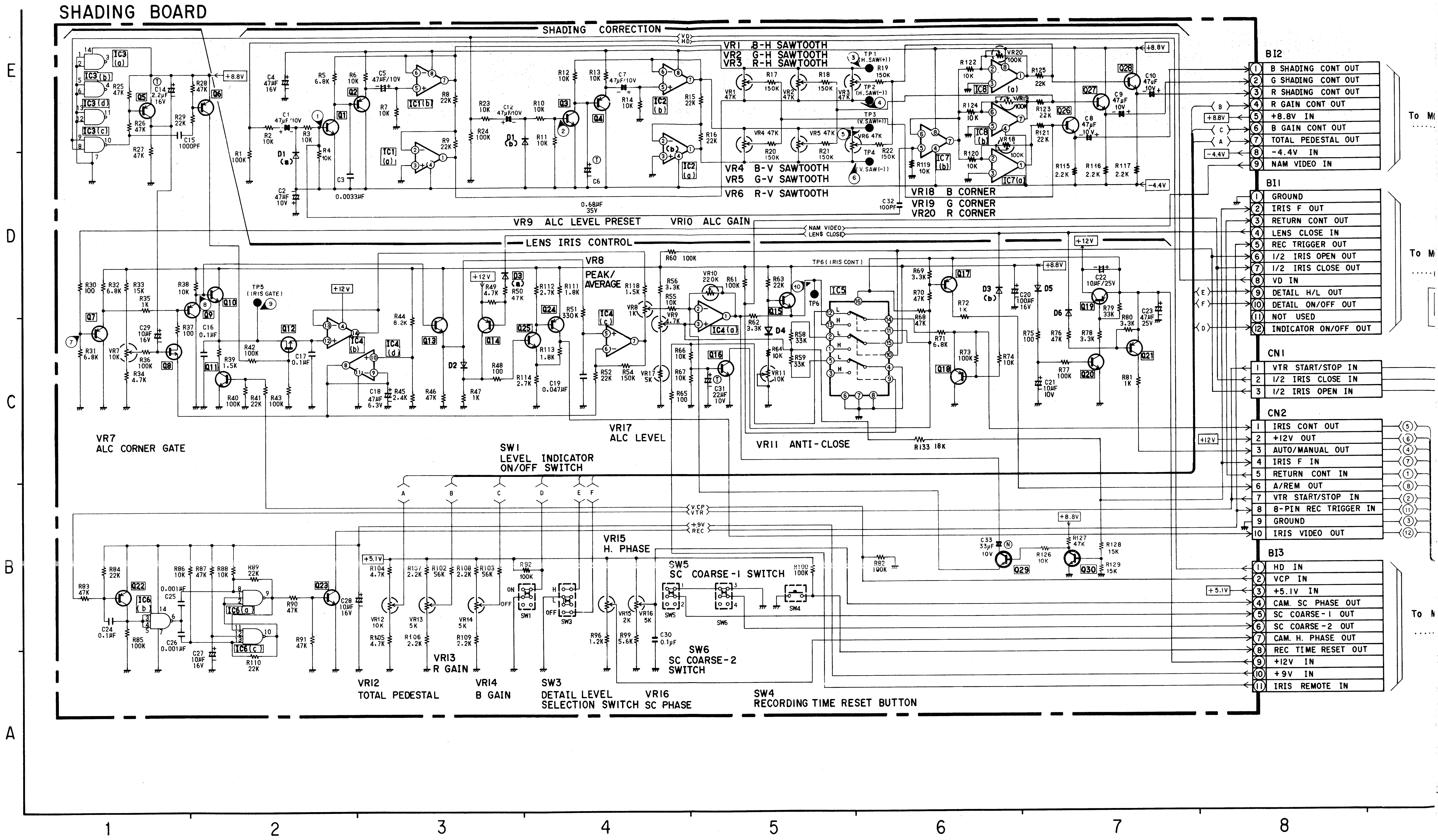
CONDUCTOR VIEW OF SHADING BOARD


FRONT SWITCH BOARD
SW1
SW2
R1
R2
½ OPEN
NOR
½ CLOSE
AWC
HOLD
ABC
CN1
BI2
BI1
SW1 LENS IRIS SELECTION SWITCH
SW2 AUTO WHITE/AUTO BLACK SET SWITCH
CN102 12PIN LENS CONNECTOR
REC SWITCH BOARD
SW1 VTR START/STOP BUTTON
CN2
CN1
SHADING BOARD
BI1
BI2
BI3
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
TP1
TP2
TP3
TP4
TP5
SW1 LEVEL INDICATOR ON/OFF SWITCH
SW5 SC COARSE-1 SWITCH
SW6 SC COARSE-2 SWITCH
VR17 ALC LEVEL
SW4 RECORDING TIME RESET BUTTON
SW3 DETAIL LEVEL SELECTION SWITCH
COMPONENT SIDE
PATTERN SIDE
VR11 ANTI-CLOSE
VR9 ALC LEVEL PRESET
VR8 PEAK/AVERAGE
VR10 ALC GAIN
VR7 ALC CORNER GATE
VR4 B-V SAWTOOTH
VR5 G-V SAWTOOTH
VR6 R-V SAWTOOTH
VR1 B-H SAWTOOTH
VR2 G-H SAWTOOTH
VR3 R-H SAWTOOTH
VR12 TOTAL PEDESTAL
VR13 R GAIN
VR14 B GAIN
VR16 SC PHASE
VR15 H PHASE
VR20 R CORNER
VR19 G CORNER
VR18 B CORNER
E
D
C
B
A
1
2
3
4
5
6

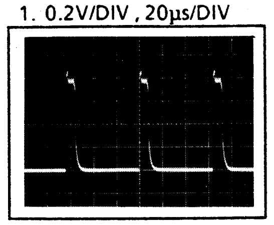
IC1	NJM4558M	C5
IC2	NJM4558M	C6
IC3	MN4011BS	B4
IC4	UPC4064G2	B2
IC5	MN4053BS	B2
IC6	MN4023BS	B4
IC7	NJM4556M	B6
IC8	NJM4556M	B6
Q1	2SD601-RS	C5
Q2	2SB709-Q	C5
Q3	2SD601-RS	C6
Q4	2SB709-Q	C6
Q5	2SB709-Q	A4
Q6	2SB709-Q	A4
Q7	2SB709-Q	B3
Q8	2SK198-PTW	A3
Q9	2SB709-Q	A3
Q10	2SD601-RS	B3
Q11	2SD601-RS	B3
Q12	2SK198-PTW	A2
Q13	2SD601-RS	B2
Q14	2SB709-Q	A2
Q15	2SD601-RS	B1
Q16	2SD601-RS	C2
Q17	2SB709-Q	B2
Q18	2SB709-Q	B2
Q19	2SB793-RS	C2
Q20	2SD601-RS	B3
Q21	2SB709-Q	C2
Q22	2SB709-Q	B4
Q23	2SD601-RS	A5
Q24	2SB709-Q	A2
Q25	2SD601-RS	B3
Q26	2SD601-RS	B3
Q27	2SD601-RS	B3
Q28	2SD601-RS	B3
Q29	2SD601-RS	B1
Q30	2SD601-RS	B1
D1	MA151WA	C6
D2	MA151K	B3
D3	MA151WK	B3
D4	MA151K	B2
D5	MA151K	C2
D6	MA151K	C3


NJM4558M
NJM4556M
MN4011BS
UPC4064G2
MN4023BS
MN4053BS
2SB709-Q
2SD601-RS
2SB793-RS
2SK198-PTW
B C E
D
S
G
MA151WK
MA151K
MA151WA
1
2
3

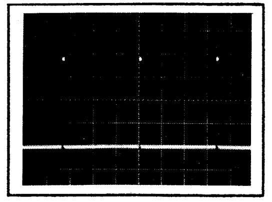
SCHEMATIC DIAGRAM OF SHADING BOARD


SHADING BOARD
SHADING CORRECTION
VR1 B-H SAWTOOTH
VR2 G-H SAWTOOTH
VR3 R-H SAWTOOTH
VR4 B-V SAWTOOTH
VR5 G-V SAWTOOTH
VR6 R-V SAWTOOTH
VR18 B CORNER
VR19 G CORNER
VR20 R CORNER
VR9 ALC LEVEL PRESET
VR10 ALC GAIN
LENS IRIS CONTROL
VR8 PEAK/AVERAGE
VR7 ALC CORNER GATE
VR17 ALC LEVEL
VR11 ANTI-CLOSE
SW1 LEVEL INDICATOR ON/OFF SWITCH
VR15 H. PHASE
SW5 SC COARSE-1 SWITCH
SW6 SC COARSE-2 SWITCH
VR12 TOTAL PEDESTAL
VR13 R GAIN
VR14 B GAIN
SW3 DETAIL LEVEL SELECTION SWITCH
VR16 SC PHASE
SW4 RECORDING TIME RESET BUTTON
TP1 (H. SAW(+))
TP2 (H. SAW(-))
TP3 (V. SAW(+))
TP4 (V. SAW(-))
TP5 (IRIS GATE)
TP6 (IRIS CONT)
+8.8V
-4.4V
+12V
+5.1V
B12
1 B SHADING CONT OUT
2 G SHADING CONT OUT
3 R SHADING CONT OUT
4 R GAIN CONT OUT
5 +8.8V IN
6 B GAIN CONT OUT
7 TOTAL PEDESTAL OUT
8 -4.4V IN
9 NAM VIDEO IN
B11
1 GROUND
2 IRIS F OUT
3 RETURN CONT OUT
4 LENS CLOSE IN
5 REC TRIGGER OUT
6 1/2 IRIS OPEN OUT
7 1/2 IRIS CLOSE OUT
8 VD IN
9 DETAIL H/L OUT
10 DETAIL ON/OFF OUT
11 NOT USED
12 INDICATOR ON/OFF OUT
CN1
1 VTR START/STOP IN
2 1/2 IRIS CLOSE IN
3 1/2 IRIS OPEN IN
CN2
1 IRIS CONT OUT
2 +12V OUT
3 AUTO/MANUAL OUT
4 IRIS F IN
5 RETURN CONT IN
6 A/REM OUT
7 VTR START/STOP IN
8 8-PIN REC TRIGGER IN
9 GROUND
10 IRIS VIDEO OUT
B13
1 HD IN
2 VCP IN
3 +5.1V IN
4 CAM. SC PHASE OUT
5 SC COARSE-1 OUT
6 SC COARSE-2 OUT
7 CAM. H. PHASE OUT
8 REC TIME RESET OUT
9 +12V IN
10 +9V IN
11 IRIS REMOTE IN
To M
E
D
C
B
A
1
2
3
4
5
6
7
8

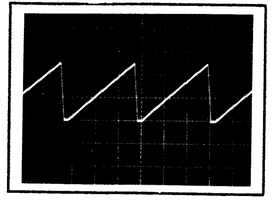
1. 0.2V/DIV, 20µs/DIV



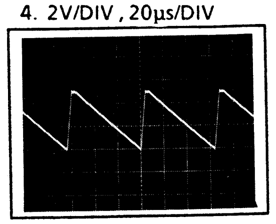
2. 0.2V/DIV, 5ms/DIV



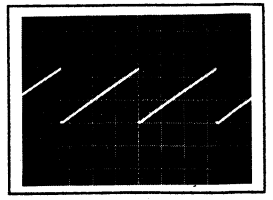
3. 2V/DIV, 20µs/DIV



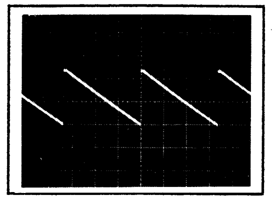
4. 2V/DIV, 20µs/DIV



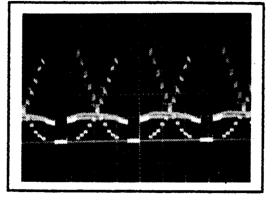
5. 2V/DIV, 5ms/DIV



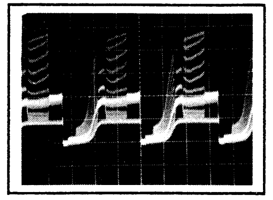
6. 2V/DIV, 5ms/DIV



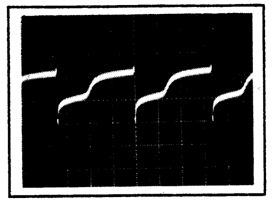
7. 0.2V/DIV, 20µs/DIV



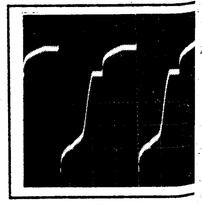
8. 0.2V/DIV, 5ms/DIV



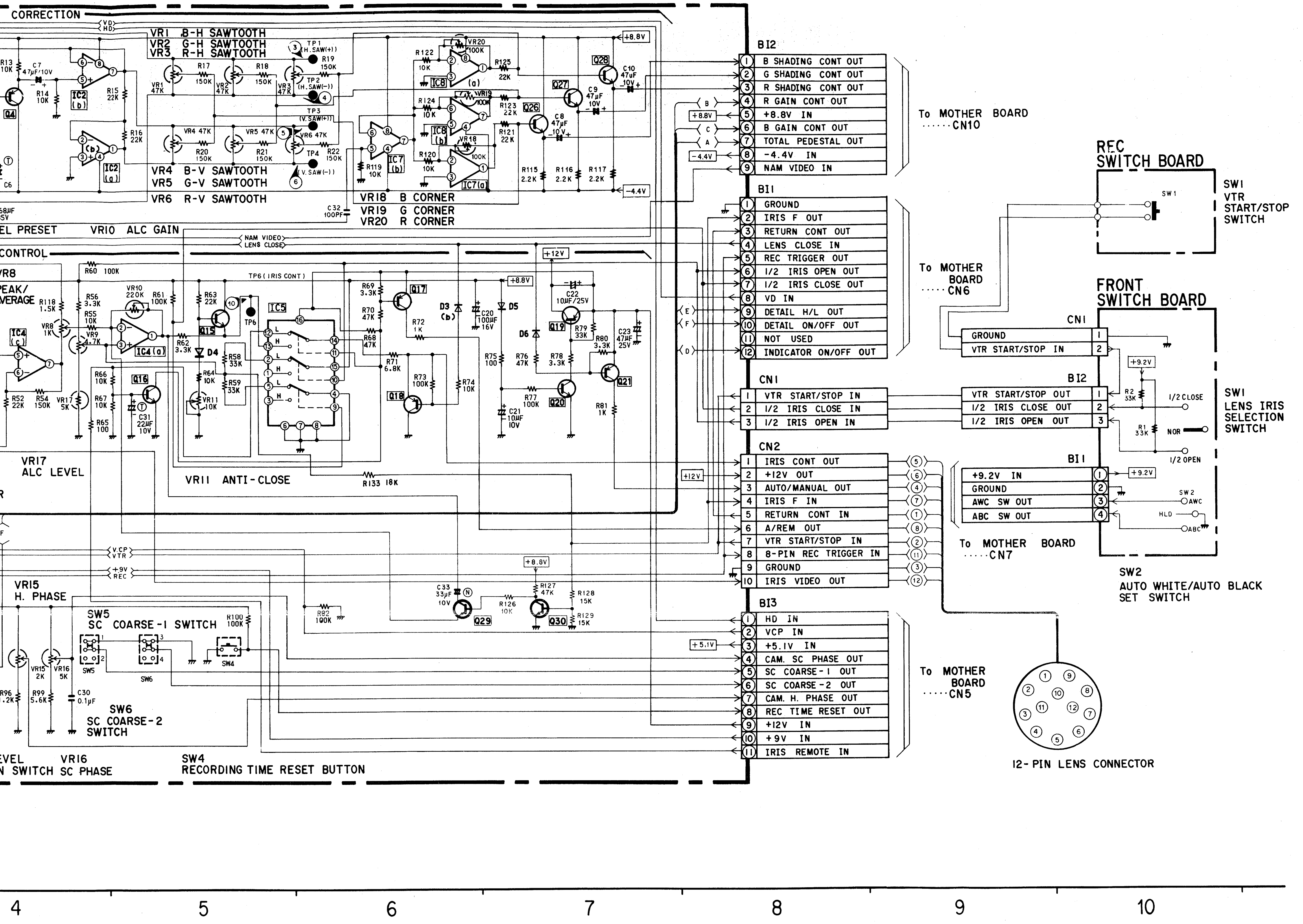
9. 0.2V/DIV, 5ms/DIV



9'. 0.2V/DIV, 5ms/



SCHEMATIC DIAGRAM OF SHADING BOARD

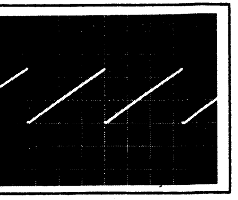

CORRECTION
VR1 B-H SAWTOOTH
VR2 G-H SAWTOOTH
VR3 R-H SAWTOOTH
VR4 B-V SAWTOOTH
VR5 G-V SAWTOOTH
VR6 R-V SAWTOOTH
VR18 B CORNER
VR19 G CORNER
VR20 R CORNER
EL PRESET
VR10 ALC GAIN
CONTROL
VR8
PEAK/
VERAGE
VR17
ALC LEVEL
VR11 ANTI-CLOSE
VR15
H. PHASE
SW5
SC COARSE-1 SWITCH
SW6
SC COARSE-2
SWITCH
EVEL
N SWITCH
VR16
SC PHASE
SW4
RECORDING TIME RESET BUTTON
B12
1 B SHADING CONT OUT
2 G SHADING CONT OUT
3 R SHADING CONT OUT
4 R GAIN CONT OUT
5 +8.8V IN
6 B GAIN CONT OUT
7 TOTAL PEDESTAL OUT
8 -4.4V IN
9 NAM VIDEO IN
To MOTHER BOARD
······CN10
B11
1 GROUND
2 IRIS F OUT
3 RETURN CONT OUT
4 LENS CLOSE IN
5 REC TRIGGER OUT
6 1/2 IRIS OPEN OUT
7 1/2 IRIS CLOSE OUT
8 VD IN
9 DETAIL H/L OUT
10 DETAIL ON/OFF OUT
11 NOT USED
12 INDICATOR ON/OFF OUT
To MOTHER
BOARD
······CN6
CN1
1 VTR START/STOP IN
2 1/2 IRIS CLOSE IN
3 1/2 IRIS OPEN IN
CN2
1 IRIS CONT OUT
2 +12V OUT
3 AUTO/MANUAL OUT
4 IRIS F IN
5 RETURN CONT IN
6 A/REM OUT
7 VTR START/STOP IN
8 8-PIN REC TRIGGER IN
9 GROUND
10 IRIS VIDEO OUT
B13
1 HD IN
2 VCP IN
3 +5.1V IN
4 CAM. SC PHASE OUT
5 SC COARSE-1 OUT
6 SC COARSE-2 OUT
7 CAM. H. PHASE OUT
8 REC TIME RESET OUT
9 +12V IN
10 +9V IN
11 IRIS REMOTE IN
To MOTHER
BOARD
······CN5
REC
SWITCH BOARD
SW1
VTR
START/STOP
SWITCH
FRONT
SWITCH BOARD
CN1
GROUND
VTR START/STOP IN
B12
VTR START/STOP OUT
1/2 IRIS CLOSE OUT
1/2 IRIS OPEN OUT
1/2 CLOSE
NOR
1/2 OPEN
SW1
LENS IRIS
SELECTION
SWITCH
B11
+9.2V IN
GROUND
AWC SW OUT
ABC SW OUT
SW 2
AWC
HLD
ABC
To MOTHER BOARD
······CN7
SW2
AUTO WHITE/AUTO BLACK
SET SWITCH
12-PIN LENS CONNECTOR
4
5
6
7
8
9
10

Pin No.	IC1	IC2	IC3	IC4	IC5	IC6	IC7	IC8		
1	−0.4	—	0	10.5	8.8	1.9	—	—		
2	0.1	—	0	3.6	3.8	1.9	—	—		
3	0	0	0	3.8	0	0	—	0		
4	−4.4	−4.4	0	13.2	0	0	−4.4	−4.4		
5	—	—	0	2.2	3.8	0	0	0		
6	0.1	—	0	2.2	0	1.9	—	—		
7	0.1	—	0	3.6	0	0	—	—		
8	8.8	8.8	0	2.0	0	1.8	8.8	8.8		
9			0	2.0	8.3	1.4				
10			8.5	2.0	8.3	1.9				
11			0	0	13.2	1.4				
12			0	2.6	0	1.9				
13			0	2.6	10.2	1.9				
14			8.8	2.6	10.2	1.9				
15					8.8					
16					13.2					

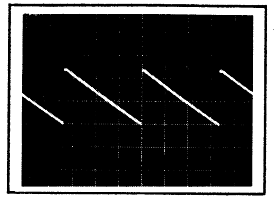
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q9	Q10	Q11
B	−4.3	−2.1	−4.5	−1.7	8.7	8.7	1.7	2.2	2.8	—
C	−2.1	−4.4	−1.7	−4.4	8.1	0	0	0	8.8	2.3
E	−4.4	−1.1	−4.4	−1.2	8.8	8.8	2.3	2.8	2.4	0
	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22
B	2.8	1.3	3.9	—	13.2	9.2	—	0.6	13.1	1.9
C	8.8	1.5	8.8	13.3	—	0	—	0	—	—
E	2.1	13.3	10.2	0	13.3	9.6	—	0	13.3	1.9
	Q23	Q24	Q25	Q26	Q27	Q28			Q8	Q12
B	0.6	8.1	1.5	−0.1	−0.1	−0.1		G	1.6	0
C	0	1.1	8.1	8.8	8.8	8.8		D	2.1	2.4
E	0	8.6	0.9	−0.7	−0.7	−0.7		S	2.0	2.6

IC1	NJM4558M	D3
IC2	NJM4558M	E4
IC3	MN4011BS	E1
IC4	UPC4064G2	D5
IC5	MN4053BS	C6
IC6	MN4023BS	B2
IC7	NJM4556M	D6
IC8	NJM4556M	E6
Q1	2SD601-RS	E2
Q2	2SB709-Q	E3
Q3	2SD601-RS	E4
Q4	2SB709-Q	E4
Q5	2SB709-Q	E1
Q6	2SB709-Q	E2
Q7	2SB709-Q	C1
Q8	2SK198-PTW	C1
Q9	2SB709-Q	D2
Q10	2SD601-RS	D2
Q11	2SD601-RS	C2
Q12	2SK198-PTW	C2
Q13	2SD601-RS	C3
Q14	2SB709-Q	C3
Q15	2SD601-RS	D5
Q16	2SD601-RS	C5
Q17	2SB709-Q	D6
Q18	2SB709-Q	C6
Q19	2SB793-RS	D7
Q20	2SD601-RS	C7
Q21	2SB709-Q	C7
Q22	2SB709-Q	B1
Q23	2SD601-RS	B2
Q24	2SB709-Q	C4
Q25	2SD601-RS	C4
Q26	2SD601-RS	E7
Q27	2SD601-RS	E7
Q28	2SD601-RS	E7
Q29	2SD601-RS	B6
Q30	2SD601-RS	B7
D1	MA151WA	E3
D2	MA151K	C3
D3	MA151WK	D3
D4	MA151K	C5
D5	MA151K	D7
D6	MA151K	D7

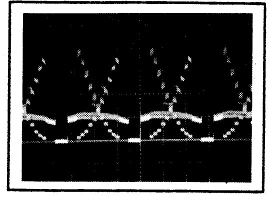
2V/DIV , 5ms/DIV



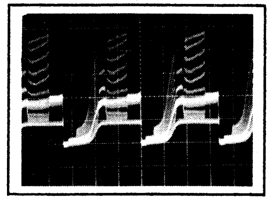
6. 2V/DIV , 5ms/DIV



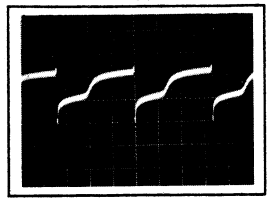
7. 0.2V/DIV , 20μs/DIV



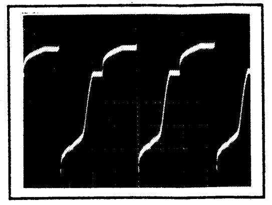
8. 0.2V/DIV , 5ms/DIV



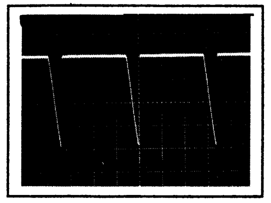
9. 0.2V/DIV , 5ms/DIV



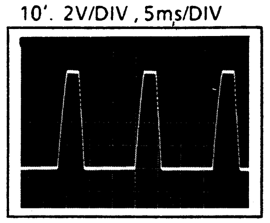
9'. 0.2V/DIV , 5ms/DIV



10. 0.5V/DIV , 5ms/DIV



10'. 2V/DIV , 5ms/DIV

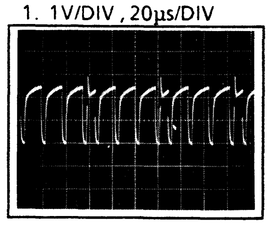


Pin No.	IC1	IC2	IC3	IC4
1	10.1	4.7	5.4	0.2
2	4.0	2.5	2.4	0
3	12.6	2.5	2.4	12.6
4	4.1	12.6	12.6	5.3
5	4.9	4.7	2.4	4.2
6	0.7	4.7	2.4	5.0
7	4.7	4.5	6.0	4.2
8	4.1	0.7	5.7	4.9
9	3.4	4.7	4.7	4.2
10	4.6	0.3	4.7	9.7
11	4.1	0	0	4.7
12	0	2.5	4.7	0
13	8.0	2.5	4.7	0.2
14	0.3	3.3	4.7	0.4

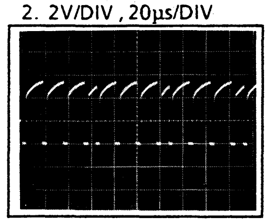
	Q1	Q2	Q3	Q5
B	13.2	8.1	8.1	12.6
C	0.3	12.6	—	13.2
E	13.4	1.6	1.6	13.3
	Q6	Q7	Q9	Q10
B	12.9	0.3	0.4	13.1
C	1.3	8.5	– 5.2	– 0.7
E	13.2	—	0	13.3
	Q11	Q12	Q13	
B	0	13.0	0.2	
C	12.6	– 5.6	10.8	
E	—	13.2	—	
	Q4			
G	1.6			
D	7.5			
S	13.2			

SCHEMATIC DIAGRAM OF PO

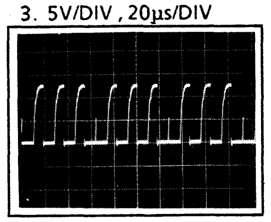
1. 1V/DIV, 20µs/DIV



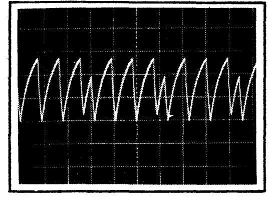
2. 2V/DIV, 20µs/DIV



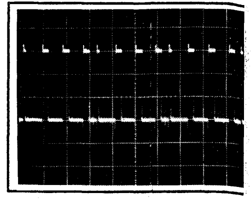
3. 5V/DIV, 20µs/DIV

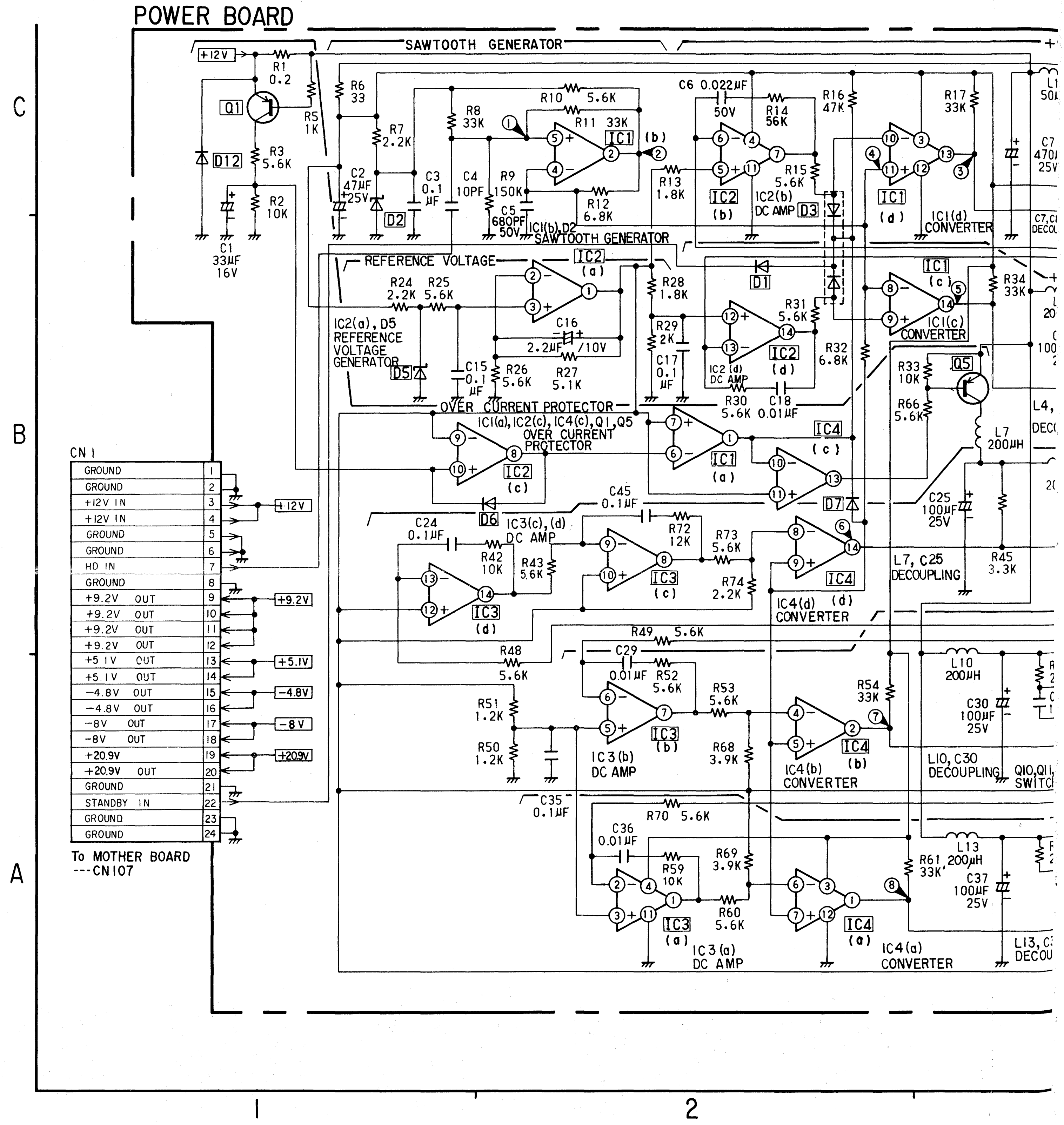


4. 1V/DIV, 20µs/DIV

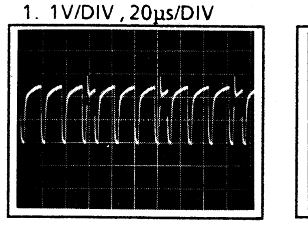


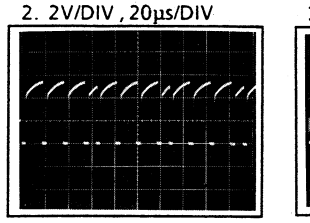
5. 0.2V/DIV, 20µs/DIV

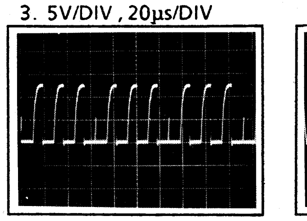


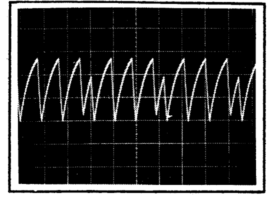


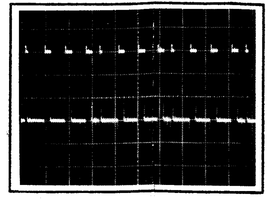
SCHEMATIC DIAGRAM OF POWER BOARD

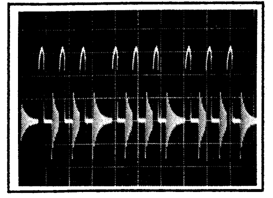

1. 1V/DIV, 20μs/DIV

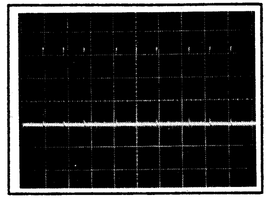

2. 2V/DIV, 20μs/DIV

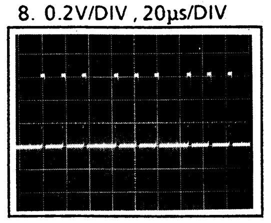

3. 5V/DIV, 20μs/DIV

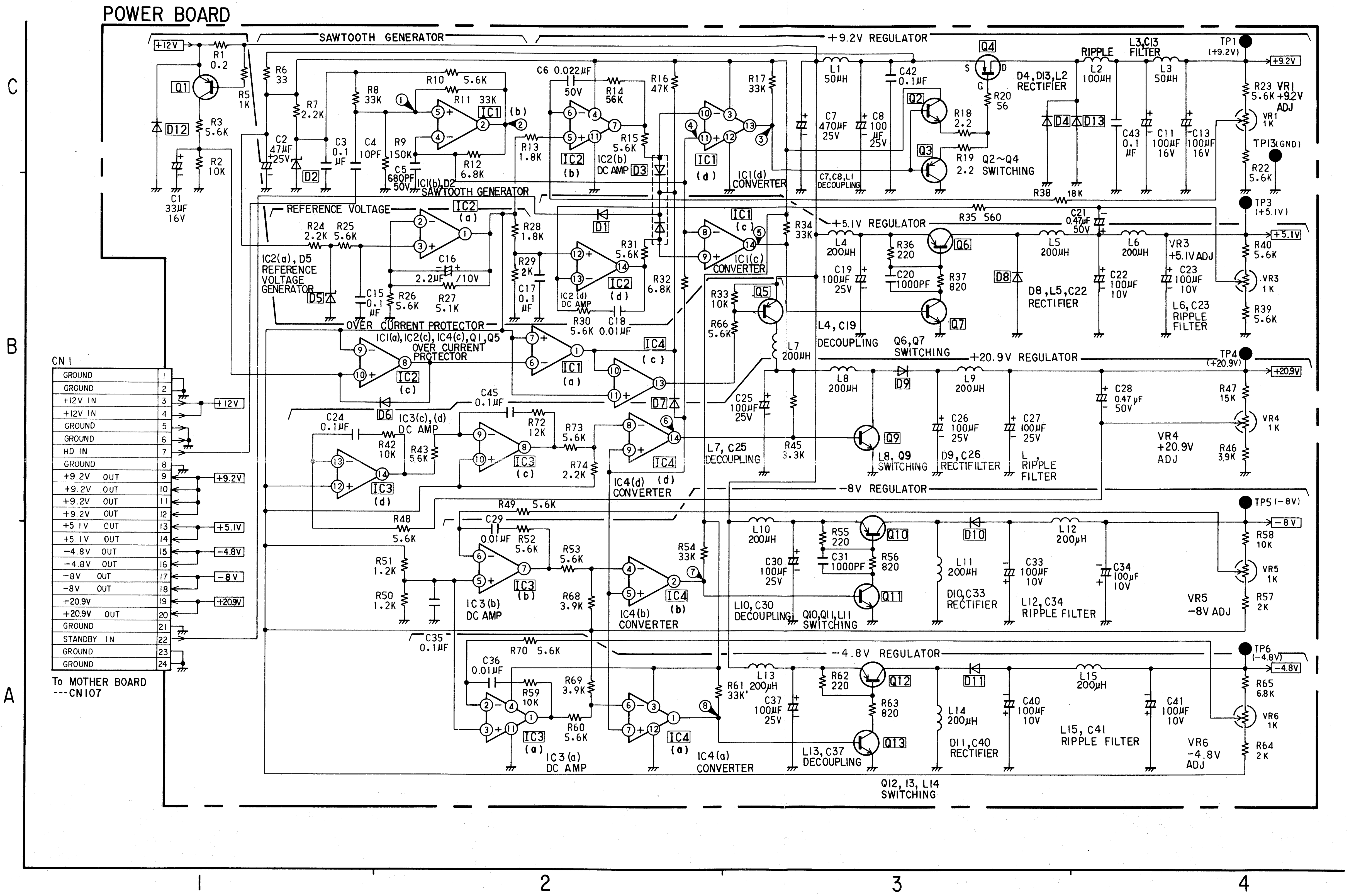

4. 1V/DIV, 20μs/DIV


5. 0.2V/DIV, 20μs/DIV


6. 0.1V/DIV, 20μs/DIV


7. 0.2V/DIV, 20μs/DIV

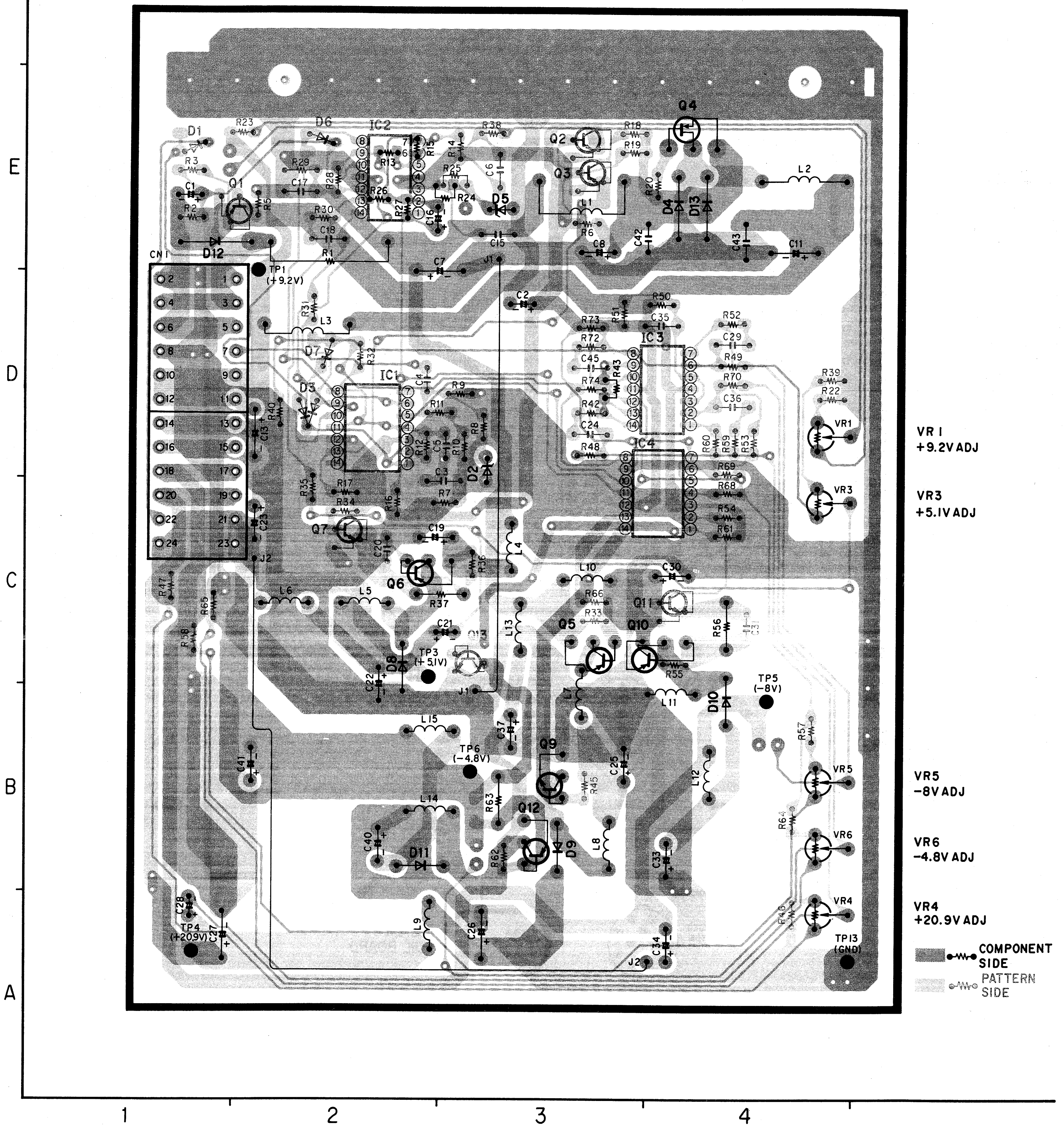

8. 0.2V/DIV, 20μs/DIV


POWER BOARD
C
B
A
1
2
3
4
SAWTOOTH GENERATOR
+9.2V REGULATOR
+5.1V REGULATOR
+20.9V REGULATOR
-8V REGULATOR
-4.8V REGULATOR
REFERENCE VOLTAGE
IC2(a), D5 REFERENCE VOLTAGE GENERATOR
OVER CURRENT PROTECTOR
IC1(a), IC2(c), IC4(c), Q1, Q5 OVER CURRENT PROTECTOR
IC1(b), D2 SAWTOOTH GENERATOR
IC2(b) DC AMP
IC2(d) DC AMP
IC1(d) CONVERTER
IC1(c) CONVERTER
IC3(c), (d) DC AMP
IC4(d) CONVERTER
IC3(b) DC AMP
IC4(b) CONVERTER
IC3(a) DC AMP
IC4(a) CONVERTER
C7, C8, L1 DECOUPLING
Q2~Q4 SWITCHING
D4, D13, L2 RECTIFIER
RIPPLE
L3, C13 FILTER
L4, C19 DECOUPLING
Q6, Q7 SWITCHING
D8, L5, C22 RECTIFIER
L6, C23 RIPPLE FILTER
L7, C25 DECOUPLING
L8, Q9 SWITCHING
D9, C26 RECTIFILTER
L, RIPPLE FILTER
L10, C30 DECOUPLING
Q10, Q11, L11 SWITCHING
D10, C33 RECTIFIER
L12, C34 RIPPLE FILTER
L13, C37 DECOUPLING
Q12, 13, L14 SWITCHING
D11, C40 RECTIFIER
L15, C41 RIPPLE FILTER
VR1 +9.2V ADJ
VR3 +5.1V ADJ
VR4 +20.9V ADJ
VR5 -8V ADJ
VR6 -4.8V ADJ
TP1 (+9.2V)
TP13 (GND)
TP3 (+5.1V)
TP4 (+20.9V)
TP5 (-8V)
TP6 (-4.8V)
+12V
+9.2V
+5.1V
+20.9V
-8V
-4.8V
R1 0.2
R2 10K
R3 5.6K
R5 1K
R6 33
R7 2.2K
R8 33K
R9 150K
R10 5.6K
R11 33K
R12 6.8K
R13 1.8K
R14 56K
R15 5.6K
R16 47K
R17 33K
R18 2.2
R19 2.2
R20 56
R22 5.6K
R23 5.6K
R24 2.2K
R25 5.6K
R26 5.6K
R27 5.1K
R28 1.8K
R29 2K
R30 5.6K
R31 5.6K
R32 6.8K
R33 10K
R34 33K
R35 560
R36 220
R37 820
R38 18K
R39 5.6K
R40 5.6K
R42 10K
R43 5.6K
R45 3.3K
R46 3.9K
R47 15K
R48 5.6K
R49 5.6K
R50 1.2K
R51 1.2K
R52 5.6K
R53 5.6K
R54 33K
R55 220
R56 820
R57 2K
R58 10K
R59 10K
R60 5.6K
R61 33K
R62 220
R63 820
R64 2K
R65 6.8K
R66 5.6K
R68 3.9K
R69 3.9K
R70 5.6K
R72 12K
R73 5.6K
R74 2.2K
VR1 1K
VR3 1K
VR4 1K
VR5 1K
VR6 1K
C1 33μF 16V
C2 47μF 25V
C3 0.1μF
C4 10PF
C5 680PF 50V
C6 0.022μF 50V
C7 470μF 25V
C8 100μF 25V
C11 100μF 16V
C13 100μF 16V
C15 0.1μF
C16 2.2μF/10V
C17 0.1μF
C18 0.01μF
C19 100μF 25V
C20 1000PF
C21 0.47μF 50V
C22 100μF 10V
C23 100μF 10V
C24 0.1μF
C25 100μF 25V
C26 100μF 25V
C27 100μF 25V
C28 0.47μF 50V
C29 0.01μF
C30 100μF 25V
C31 1000PF
C33 100μF 10V
C34 100μF 10V
C35 0.1μF
C36 0.01μF
C37 100μF 25V
C40 100μF 10V
C41 100μF 10V
C42 0.1μF
C43 0.1μF
L1 50μH
L2 100μH
L3 50μH
L4 200μH
L5 200μH
L6 200μH
L7 200μH
L8 200μH
L9 200μH
L10 200μH
L11 200μH
L12 200μH
L13 200μH
L14 200μH
L15 200μH
CN1
1 GROUND
2 GROUND
3 +12V IN
4 +12V IN
5 GROUND
6 GROUND
7 HD IN
8 GROUND
9 +9.2V OUT
10 +9.2V OUT
11 +9.2V OUT
12 +9.2V OUT
13 +5.1V OUT
14 +5.1V OUT
15 -4.8V OUT
16 -4.8V OUT
17 -8V OUT
18 -8V OUT
19 +20.9V
20 +20.9V OUT
21 GROUND
22 STANDBY IN
23 GROUND
24 GROUND
To MOTHER BOARD ---CN107

IC1	NJM2901M	B2, B3, C2
IC2	YWUPC4064G2	B2, C2
IC3	YWUPC4064G2	A2, B1, B2
IC4	NJM2901M	A2, B2
Q1	2SB709-Q	C1
Q2	2SD601-RS	C3
Q3	2SB709-Q	C3
Q4	2SJ122	C3
Q5	2SA1244Y	B3
Q6	2SA1244Y	B3
Q7	2SD601-RS	B3
Q9	2SC3074Y	B3
Q10	2SA1244Y	A3
Q11	2SD601-RS	A3
Q12	2SA1244Y	A3
Q13	2SD601-RS	A3
D1	MA151K	B2
D2	MA1062-L	C1
D3	MA151WK	B2
D4	ERA81004	C3
D5	LM385Z2.5V	B1
D6	MA151K	B2
D7	MA151K	B2
D8	ERA81004	B3
D9	ERA81004	B3
D10	ERA81004	A3
D11	ERA81004	A3
D12	V03G	C1
D13	ERA81004	C4

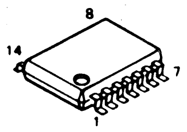
CONDUCTOR VIEW OF POWER BOARD

POWER BOARD

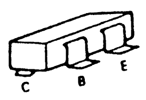

E
D
C
B
A
1
2
3
4
CN1
TP1 (+9.2V)
TP3 (+5.1V)
TP4 (+20.9V)
TP5 (-8V)
TP6 (-4.8V)
TP13 (GND)
VR1
+9.2V ADJ
VR3
+5.1V ADJ
VR5
-8V ADJ
VR6
-4.8V ADJ
VR4
+20.9V ADJ
COMPONENT SIDE
PATTERN SIDE

IC1	NJM2901M	D2
IC2	UPC4064G2	E2
IC3	UPC4064G2	D4
IC4	NJM2901M	D4
Q1	2SB709-Q	E1
Q2	2SD601-QR	E3
Q3	2SB709-Q	E3
Q4	2SJ122	E4
Q5	YF2SA1244LBY	C3
Q6	YF2SA1244LBY	C2
Q7	2SD601-QR	C2
Q9	2SC3074Y	B3
Q10	YF2SA1244LBY	C3
Q11	2SD601-QR	C4
Q12	YF2SA1244LBY	B3
Q13	2SD601-QR	C2
D1	MA151K	E1
D2	MA1062-L	D2
D3	MA151WK	D2
D4	ERA81004	E4
D5	YFLM385Z	E3
D6	MA151K	E2
D7	MA151K	D2
D8	ERA81004	C2
D9	ERA81004	B3
D10	ERA81004	B4
D11	ERA81004	B2
D12	V03G	E1
D13	ERA81004	E4

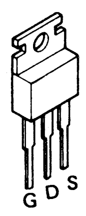
NJM2901M
UPC4064G2



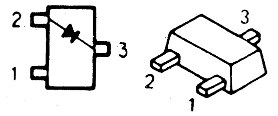
2SB709-Q
2SD601-QR



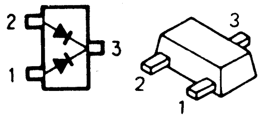
2SJ122



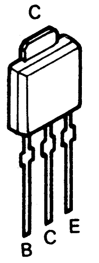
MA151K



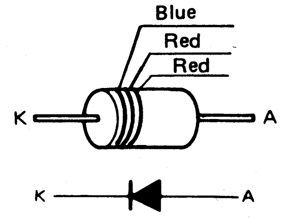
MA151WK



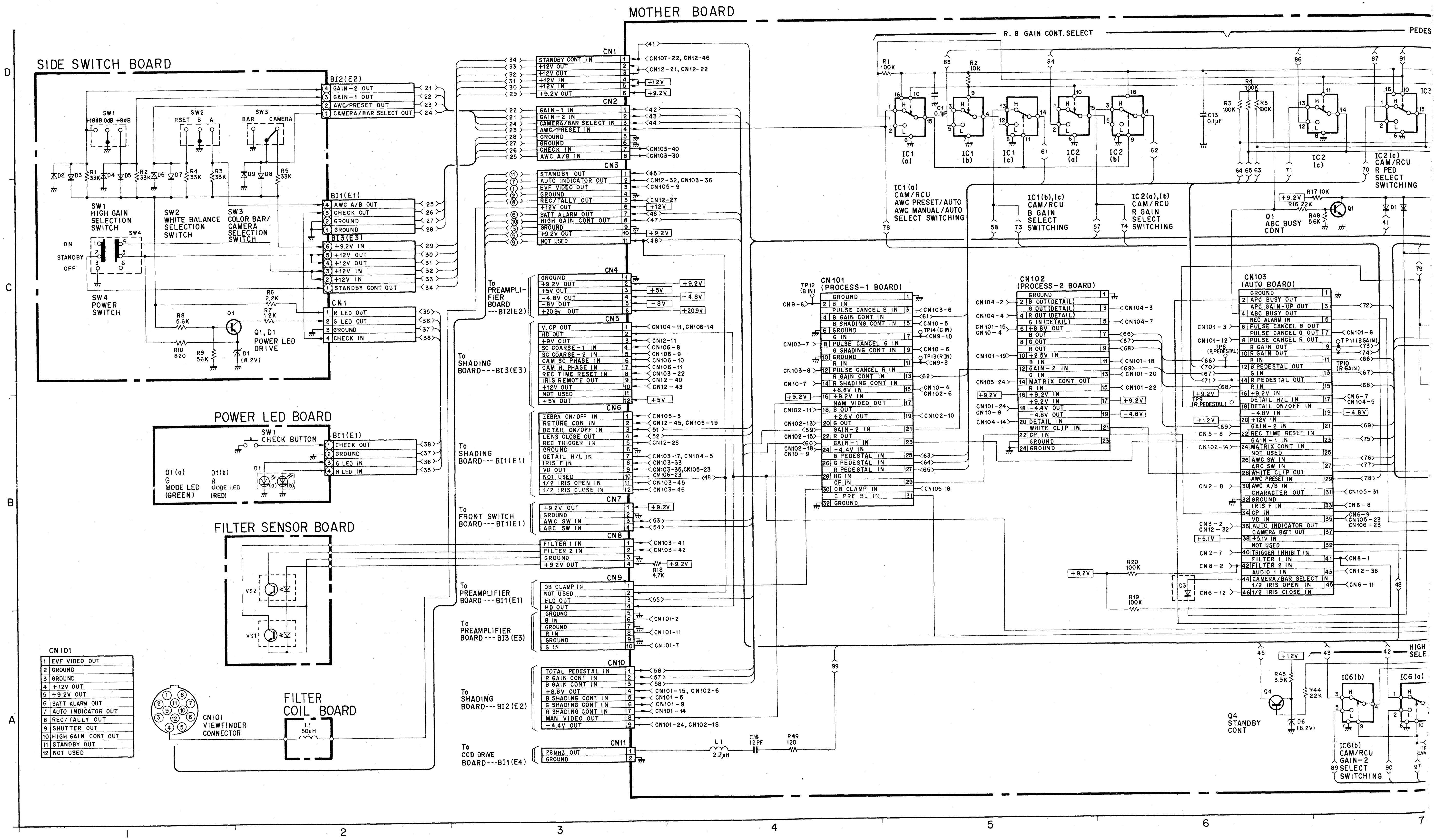
2SC3074Y



MA1062-L


Blue
Red
Red
K
A
K
A

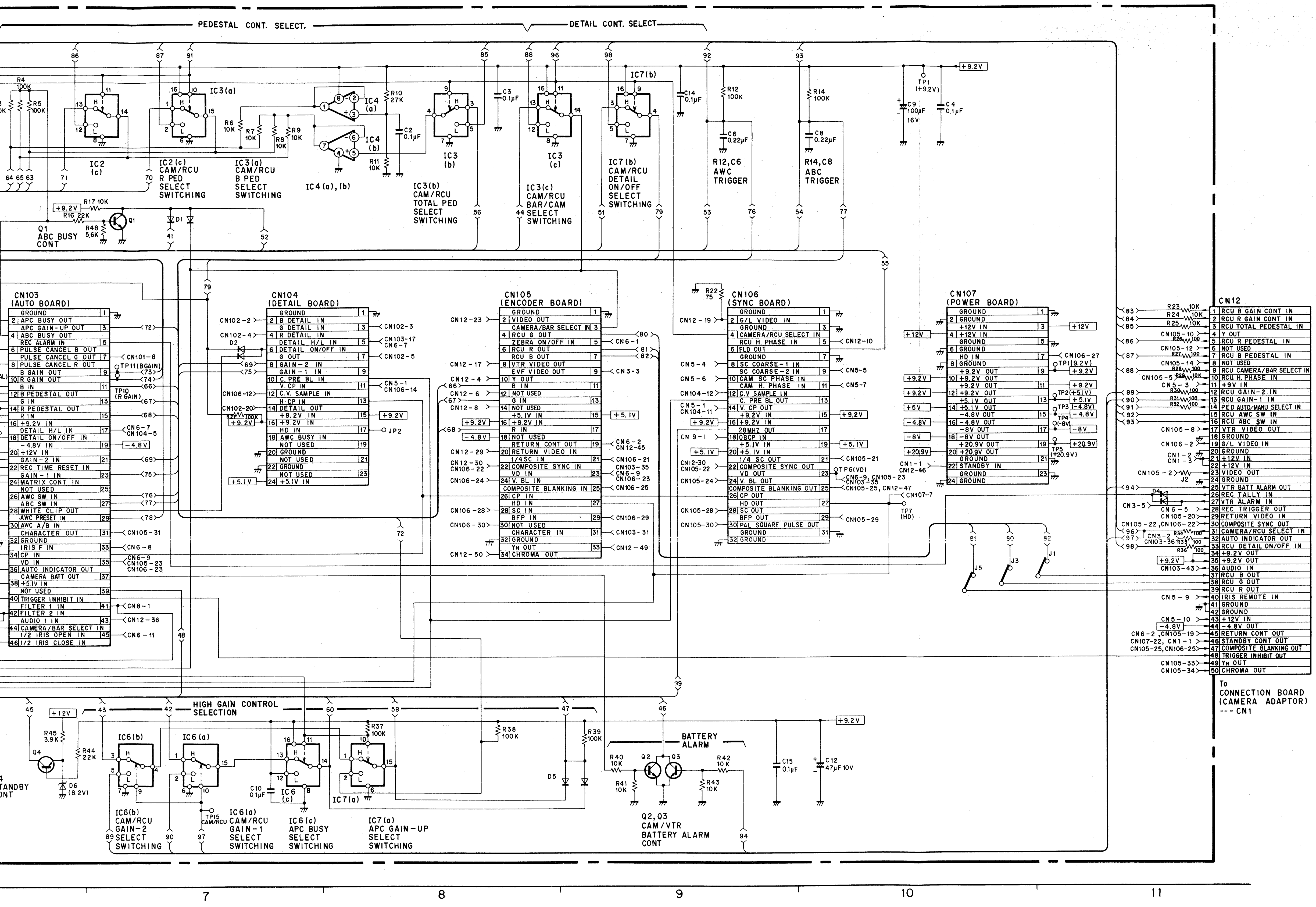
SCHEMATIC DIAGRAM OF MOT


MOTHER BOARD
SIDE SWITCH BOARD
POWER LED BOARD
FILTER SENSOR BOARD
FILTER COIL BOARD
BI2(E2)
BI1(E1)
BI3(E3)
SW1 HIGH GAIN SELECTION SWITCH
SW2 WHITE BALANCE SELECTION SWITCH
SW3 COLOR BAR/CAMERA SELECTION SWITCH
SW4 POWER SWITCH
Q1, D1 POWER LED DRIVE
SW1 CHECK BUTTON
D1(a) G MODE LED (GREEN)
D1(b) R MODE LED (RED)
CN101 VIEWFINDER CONNECTOR
L1 50μH
CN1
CN2
CN3
CN4
CN5
CN6
CN7
CN8
CN9
CN10
CN11
To PREAMPLIFIER BOARD---BI2(E2)
To SHADING BOARD---BI3(E3)
To SHADING BOARD---BI1(E1)
To FRONT SWITCH BOARD---BI1(E1)
To PREAMPLIFIER BOARD---BI1(E1)
To PREAMPLIFIER BOARD---BI3(E3)
To SHADING BOARD---BI2(E2)
To CCD DRIVE BOARD---BI1(E4)
CN101 (PROCESS-1 BOARD)
CN102 (PROCESS-2 BOARD)
CN103 (AUTO BOARD)
R. B GAIN CONT. SELECT
PEDES
IC1(a) CAM/RCU AWC PRESET/AUTO AWC MANUAL/AUTO SELECT SWITCHING
IC1(b),(c) CAM/RCU B GAIN SELECT SWITCHING
IC2(a),(b) CAM/RCU R GAIN SELECT SWITCHING
IC2(c) CAM/RCU R PED SELECT SWITCHING
Q1 ABC BUSY CONT
Q4 STANDBY CONT
IC6(b) CAM/RCU GAIN-2 SELECT SWITCHING
HIGH SELE
A
B
C
D
1
2
3
4
5
6
7

CN101

1	EVF VIDEO OUT
2	GROUND
3	GROUND
4	+12V OUT
5	+9.2V OUT
6	BATT ALARM OUT
7	AUTO INDICATOR OUT
8	REC/TALLY OUT
9	SHUTTER OUT
10	HIGH GAIN CONT OUT
11	STANDBY OUT
12	NOT USED

DIAGRAM OF MOTHER BOARD


PEDESTAL CONT. SELECT.
DETAIL CONT. SELECT
IC2 (c)
IC2 (c) CAM/RCU R PED SELECT SWITCHING
IC3(a) CAM/RCU B PED SELECT SWITCHING
IC4 (a), (b)
IC3(b) CAM/RCU TOTAL PED SELECT SWITCHING
IC3(c) CAM/RCU BAR/CAM SELECT SWITCHING
IC7(b) CAM/RCU DETAIL ON/OFF SELECT SWITCHING
R12,C6 AWC TRIGGER
R14,C8 ABC TRIGGER
Q1 ABC BUSY CONT
CN103 (AUTO BOARD)
CN104 (DETAIL BOARD)
CN105 (ENCODER BOARD)
CN106 (SYNC BOARD)
CN107 (POWER BOARD)
CN12
1 RCU B GAIN CONT IN
2 RCU R GAIN CONT IN
3 RCU TOTAL PEDESTAL IN
4 Y OUT
5 RCU R PEDESTAL IN
6 NOT USED
7 RCU B PEDESTAL IN
8 NOT USED
9 RCU CAMERA/BAR SELECT IN
10 RCU H. PHASE IN
11 +9V IN
12 RCU GAIN-2 IN
13 RCU GAIN-1 IN
14 PED AUTO/MANU SELECT IN
15 RCU AWC SW IN
16 RCU ABC SW IN
17 VTR VIDEO OUT
18 GROUND
19 G/L VIDEO IN
20 GROUND
21 +12V IN
22 +12V IN
23 VIDEO OUT
24 GROUND
25 VTR BATT ALARM OUT
26 REC TALLY IN
27 VTR ALARM IN
28 REC TRIGGER OUT
29 RETURN VIDEO IN
30 COMPOSITE SYNC OUT
31 CAMERA/RCU SELECT IN
32 AUTO INDICATOR OUT
33 RCU DETAIL ON/OFF IN
34 +9.2V OUT
35 +9.2V OUT
36 AUDIO IN
37 RCU B OUT
38 RCU G OUT
39 RCU R OUT
40 IRIS REMOTE IN
41 GROUND
42 GROUND
43 +12V IN
44 -4.8V OUT
45 RETURN CONT OUT
46 STANDBY CONT OUT
47 COMPOSITE BLANKING OUT
48 TRIGGER INHIBIT OUT
49 YH OUT
50 CHROMA OUT
To CONNECTION BOARD (CAMERA ADAPTOR) --- CN1
HIGH GAIN CONTROL SELECTION
BATTERY ALARM
IC6(b) CAM/RCU GAIN-2 SELECT SWITCHING
IC6(a) CAM/RCU GAIN-1 SELECT SWITCHING
IC6(c) APC BUSY SELECT SWITCHING
IC7(a) APC GAIN-UP SELECT SWITCHING
Q2,Q3 CAM/VTR BATTERY ALARM CONT
TANDBY ONT
7
8
9
10
11

Mother Board

IC1	MN4053BS	D5
IC2	MN4053BS	D5, D6, B7
IC3	MN4053BS	D7, D8
IC4	YWUPC4062G2	D8
IC6	MN4053BS	A7
IC7	MN4053BS	A5, A8, D9
Q1	2SD601-RS	C6
Q2	2SD601-RS	A9
Q3	2SD601-RS	A9
Q4	2SB710-QRS	A6
Q5	2SD601-RS	A5
D1	MA151WA	C6
D2	MA151WA	C6
D3	MA151A	B6
D4	MA151WK	C7
D5	MA151WA	A9
D6	MA4082M	A6

Power LED Board

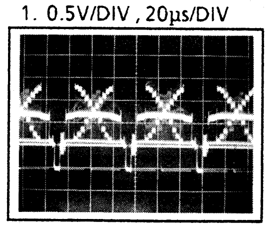
D1	LN11WP23	B2

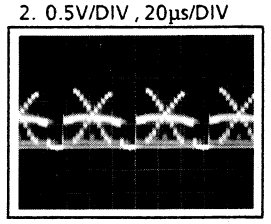
Side Switch Board

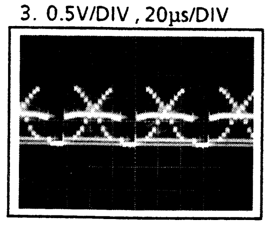
Q1	2SB710-QRS	C2
D1	MA4082M	C2
D2	MA151K	D1
D3	MA151K	D1
D4	MA151K	D1
D5	MA151K	D1
D6	MA151K	D1
D7	MA151K	D1
D8	MA151K	D2
D9	MA151K	D2

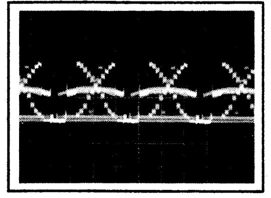
	IC1	IC2	IC3	IC4	IC6	IC7
Pin 1	8.2	0.9	2.4	2.5	8.3	0.1
2	0	-0.4	-0.4	2.5	1.0	9.2
3	0	2.4	0	2.5	0	7.9
4	0	2.4	2.5	0	0.1	7.9
5	-0.3	0.9	0	2.5	1.0	0.7
6	0	0	0	2.5	0	0
7	0	0	0	2.5	0	0
8	0	0	0	9.2	0	0
9	7.0	8.2	7.0		7.0	7.0
10	7.0	7.0	9.2		7.0	9.2
11	8.2	9.2	7.0		9.2	0
12	0.6	-0.4	-0.4		9.2	0
13	2.4	2.4	9.5		8.3	0
14	2.4	2.4	9.5		8.3	0
15	8.2	.0.9	2.4		0	0.2
16	9.2	9.2	9.2		0	9.2

	Q1	Q2	Q3	Q4
B	0	0	0	8.1
C	10.0	9.2	9.2	0
E	0	0	0	9.2


1. 0.5V/DIV , 20µs/DIV


2. 0.5V/DIV , 20µs/DIV

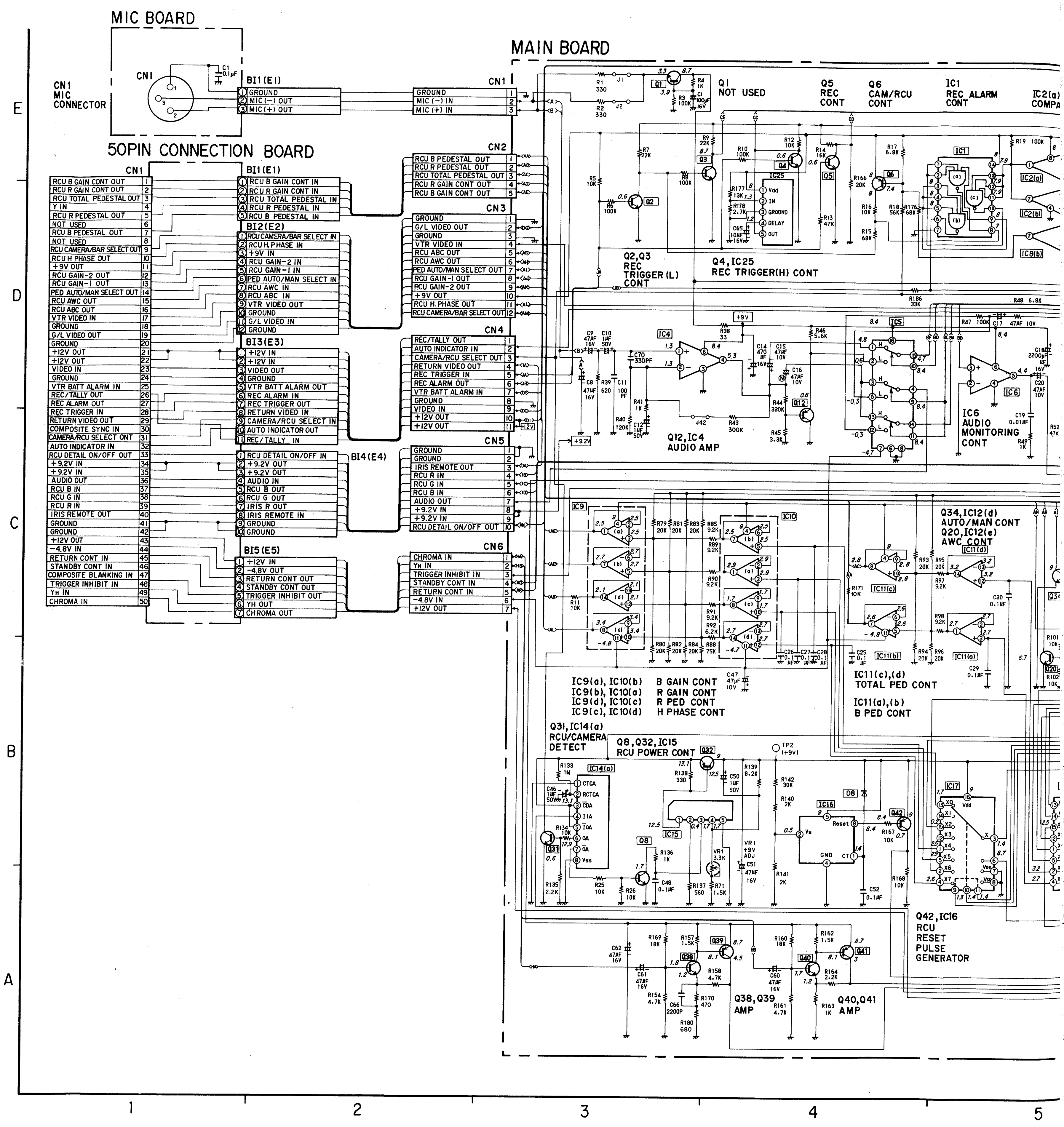

3. 0.5V/DIV , 20µs/DIV


4. 0.5V/DIV , 20µs/DIV

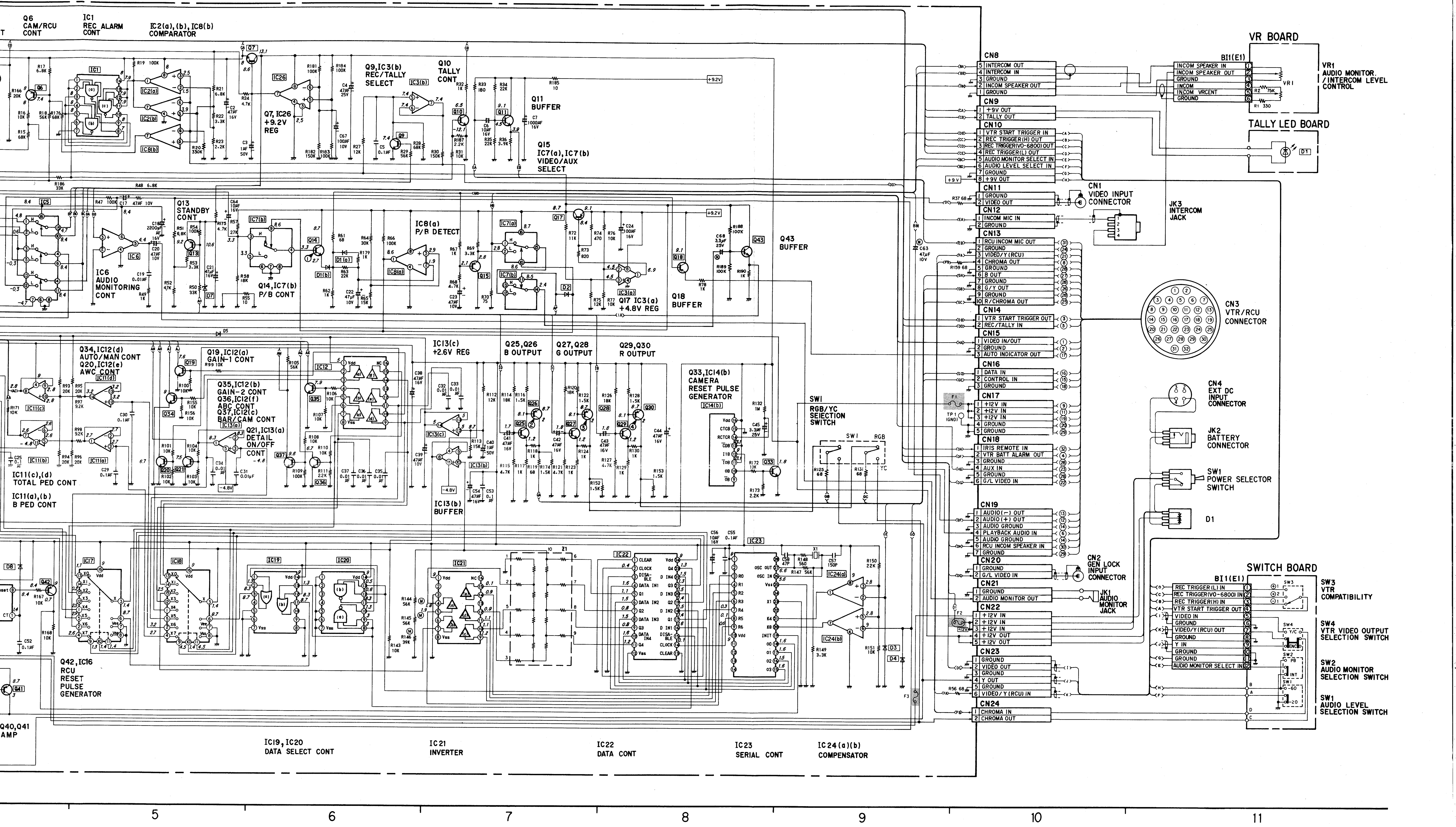
IC1	MN4023BS	D5
IC2	NJM2903M	D5
IC3	NJM2904M	C8, E6
IC4	YWNJM387D	D3
IC5	MN4053BS	D4
IC6	YFNJM386D	D5
IC7	MN4053BS	C7, D6, D7
IC8	NJM2903M	D5, D6
IC9	YWUPC4064G2	C3
IC10	YWUPC4064G2	C4
IC11	YWUPC4064G2	C4, C5
IC12	MN4050BS	C6
IC13	YWUPC4064G2	B7, C5, C7
IC14	MN4538BS	B3 C8
IC15	M5231L	B3
IC16	TL7700CPS	B4
IC17	MN4051BS	B5
IC18	MN4051BS	B5
IC19	MN4071BS	B6
IC20	MN4011BS	B6
IC21	MN4050BS	B7
IC22	TP4508NP	B8
IC23	M46015	B8
IC24	NJM2904M	B9
IC25	YWM51957BL	D4
IC26	NJM2903M	E6
Q1	2SD973A-RS	E3
Q2	2SD601-RS	D3
Q3	2SD601-RS	E3
Q4	2SD601-RS	E4
Q5	2SD601-RS	E4
Q6	2SB709-Q	E4
Q7	2SD602-QRS	E5
Q8	2SD601-RS	A3
Q9	2SD601-RS	D6
Q10	2SD602-QRS	D7
Q11	2SD602-QRS	D7
Q12	2SB709-Q	D4
Q13	2SB709-Q	D5
Q14	2SD601-RS	D6
Q15	2SB709-Q	C7
Q17	2SB793-RS	D7
Q18	2SD601-RS	D8
Q19	2SD601-RS	C5
Q20	2SD601-RS	B5
Q21	2SD601-RS	B5
Q25	2SD601-RS	C7
Q26	2SB709-Q	C7
Q27	2SD601-RS	C7
Q28	2SB709-Q	C7
Q29	2SD601-RS	C8
Q30	2SB709-Q	C8
Q31	2SD601-RS	B3
Q32	2SB793-RS	B4
Q33	2SD601-RS	B8
Q34	2SD601-RS	C5
Q35	2SD601-RS	C6
Q36	2SD601-RS	B6
Q37	2SD601-RS	B6
Q38	2SD601-RS	A3
Q39	2SB709-Q	A4
Q40	2SD601-RS	A4
Q41	2SB709-Q	A4
Q42	2SB709-Q	B4
Q43	2SD601-RS	D8
Q44	2SD601-RS	A5
Q45	2SD601-RS	
D1	MA151WK	D6
D2	MA151K	A9
D3	YWERA81-004	A9
D4	YWERA81-004	A9
D5	MA151A	C5
D7	MA4091M	C5
D8	MA151K	B4

PRODUCT SAFETY NOTE

The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

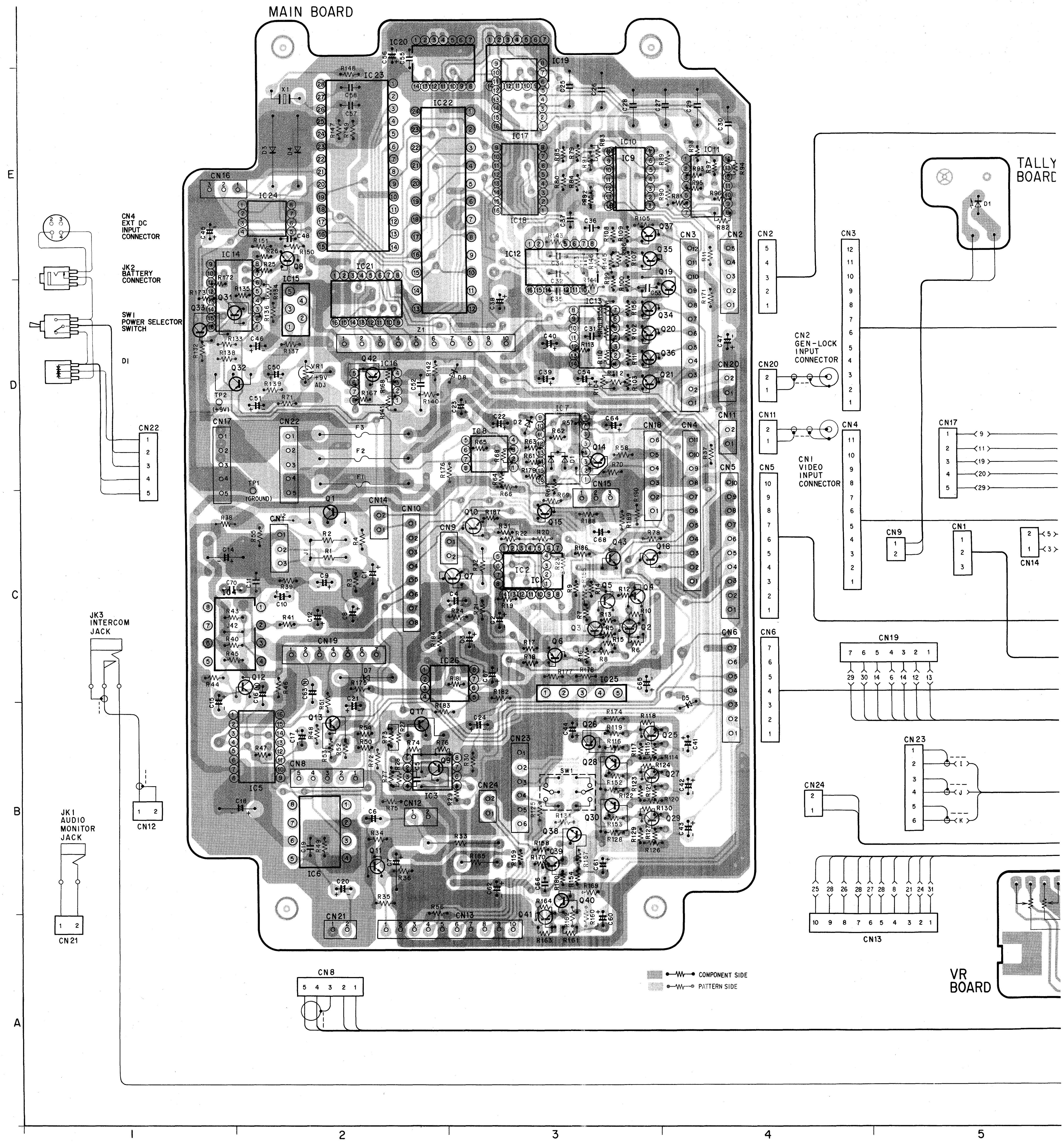

MIC BOARD
CN1 MIC CONNECTOR
MAIN BOARD
50PIN CONNECTION BOARD
BI1(E1)
BI2(E2)
BI3(E3)
BI4(E4)
BI5(E5)
CN1
CN2
CN3
CN4
CN5
CN6
GROUND
MIC (−) OUT
MIC (+) OUT
MIC (−) IN
MIC (+) IN
RCU B GAIN CONT OUT
RCU R GAIN CONT OUT
RCU TOTAL PEDESTAL OUT
Y IN
RCU R PEDESTAL OUT
NOT USED
RCU B PEDESTAL OUT
RCU CAMERA/BAR SELECT OUT
RCU H PHASE OUT
+9V OUT
RCU GAIN-2 OUT
RCU GAIN-1 OUT
PED AUTO/MAN SELECT OUT
RCU AWC OUT
RCU ABC OUT
VTR VIDEO IN
G/L VIDEO OUT
+12V OUT
VIDEO IN
VTR BATT ALARM IN
REC/TALLY OUT
REC ALARM OUT
REC TRIGGER IN
RETURN VIDEO OUT
COMPOSITE SYNC IN
CAMERA/RCU SELECT OUT
AUTO INDICATOR IN
RCU DETAIL ON/OFF OUT
+9.2V IN
AUDIO OUT
RCU B IN
RCU G IN
RCU R IN
IRIS REMOTE OUT
−4.8V IN
RETURN CONT IN
STANDBY CONT IN
COMPOSITE BLANKING IN
TRIGGER INHIBIT IN
YH IN
CHROMA IN
Q1 NOT USED
Q5 REC CONT
Q6 CAM/RCU CONT
IC1 REC ALARM CONT
IC2(a) COMPA
Q2,Q3 REC TRIGGER (L) CONT
Q4,IC25 REC TRIGGER(H) CONT
Q12,IC4 AUDIO AMP
IC6 AUDIO MONITORING CONT
Q34,IC12(d) AUTO/MAN CONT
Q20,IC12(e) AWC CONT
IC9(a),IC10(b) B GAIN CONT
IC9(b),IC10(a) R GAIN CONT
IC9(d),IC10(c) R PED CONT
IC9(c),IC10(d) H PHASE CONT
IC11(c),(d) TOTAL PED CONT
IC11(a),(b) B PED CONT
Q31,IC14(a) RCU/CAMERA DETECT
Q8,Q32,IC15 RCU POWER CONT
TP2 (+9V)
Q42,IC16 RCU RESET PULSE GENERATOR
Q38,Q39 AMP
Q40,Q41 AMP
E
D
C
B
A
1
2
3
4
5

SCHEMATIC DIAGRAM OF CAMERA ADAPTOR

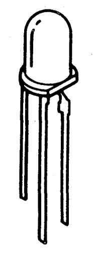


Q6 CAM/RCU CONT
IC1 REC ALARM CONT
IC2(a),(b),IC8(b) COMPARATOR
Q7,IC26 +9.2V REG
Q9,IC3(b) REC/TALLY SELECT
Q10 TALLY CONT
Q11 BUFFER
Q15 IC7(a),IC7(b) VIDEO/AUX SELECT
Q13 STANDBY CONT
IC6 AUDIO MONITORING CONT
Q14,IC7(b) P/B CONT
IC8(a) P/R DETECT
Q17 IC3(a) +4.8V REG
Q18 BUFFER
Q43 BUFFER
Q34,IC12(d) AUTO/MAN CONT
Q20,IC12(e) AWC CONT
Q19,IC12(a) GAIN-1 CONT
Q35,IC12(b) GAIN-2 CONT
Q36,IC12(f) ABC CONT
Q37,IC12(c) BAR/CAM CONT
Q21,IC13(a) DETAIL ON/OFF CONT
IC11(c),(d) TOTAL PED CONT
IC11(a),(b) B PED CONT
IC13(c) +2.6V REG
IC13(b) BUFFER
Q25,Q26 B OUTPUT
Q27,Q28 G OUTPUT
Q29,Q30 R OUTPUT
Q33,IC14(b) CAMERA RESET PULSE GENERATOR
SW1 RGB/YC SELECTION SWITCH
Q42,IC16 RCU RESET PULSE GENERATOR
Q40,Q41 AMP
IC19,IC20 DATA SELECT CONT
IC21 INVERTER
IC22 DATA CONT
IC23 SERIAL CONT
IC24(a)(b) COMPENSATOR
VR BOARD
VR1 AUDIO MONITOR /INTERCOM LEVEL CONTROL
TALLY LED BOARD
CN8
5 INTERCOM OUT
4 INTERCOM IN
3 GROUND
2 INCOM SPEAKER OUT
1 GROUND
CN9
1 +9V OUT
2 TALLY OUT
CN10
1 VTR START TRIGGER IN
2 REC TRIGGER(H) OUT
3 REC TRIGGER(VO-6800) OUT
4 REC TRIGGER(L) OUT
5 AUDIO MONITOR SELECT IN
6 AUDIO LEVEL SELECT IN
7 GROUND
8 +9V OUT
CN11
1 GROUND
2 VIDEO OUT
CN1 VIDEO INPUT CONNECTOR
CN12
1 INCOM MIC IN
2 GROUND
JK3 INTERCOM JACK
CN13
1 RCU INCOM MIC OUT
2 GROUND
3 VIDEO/Y(RCU)
4 CHROMA OUT
5 GROUND
6 B OUT
7 GROUND
8 G/Y OUT
9 GROUND
10 R/CHROMA OUT
CN14
1 VTR START TRIGGER OUT
2 REC/TALLY IN
CN15
1 VIDEO IN/OUT
2 GROUND
3 AUTO INDICATOR OUT
CN3 VTR/RCU CONNECTOR
CN16
1 DATA IN
2 CONTROL IN
3 GROUND
CN17
1 +12V IN
2 +12V IN
3 +12V IN
4 GROUND
5 GROUND
CN4 EXT DC INPUT CONNECTOR
CN18
1 IRIS REMOTE IN
2 VTR BATT ALARM OUT
3 GROUND
4 AUX IN
5 GROUND
6 G/L VIDEO IN
JK2 BATTERY CONNECTOR
SW1 POWER SELECTOR SWITCH
D1
CN19
1 AUDIO(−) OUT
2 AUDIO(+) OUT
3 AUDIO GROUND
4 PLAYBACK AUDIO IN
5 AUDIO GROUND
6 RCU INCOM SPEAKER IN
7 GROUND
CN20
1 GROUND
2 G/L VIDEO IN
CN2 GEN LOCK INPUT CONNECTOR
CN21
1 GROUND
2 AUDIO MONITOR OUT
JK1 AUDIO MONITOR JACK
CN22
1 +12V IN
2 +12V IN
3 +12V IN
4 +12V OUT
5 +12V OUT
CN23
1 GROUND
2 VIDEO OUT
3 GROUND
4 Y OUT
5 GROUND
6 VIDEO/Y(RCU) IN
CN24
1 CHROMA IN
2 CHROMA OUT
SWITCH BOARD
BI1(E1)
REC TRIGGER(L) IN
REC TRIGGER(VO-6800) IN
REC TRIGGER(H) IN
VTR START TRIGGER OUT
VIDEO IN
GROUND
VIDEO/Y(RCU) OUT
GROUND
Y IN
GROUND
GROUND
AUDIO MONITOR SELECT IN
SW3 VTR COMPATIBILITY
SW4 VTR VIDEO OUTPUT SELECTION SWITCH
SW2 AUDIO MONITOR SELECTION SWITCH
SW1 AUDIO LEVEL SELECTION SWITCH
5
6
7
8
9
10
11

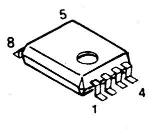
CONDUCTOR VIEW OF C


MAIN BOARD
TALLY BOARD
VR BOARD
CN4 EXT DC INPUT CONNECTOR
JK2 BATTERY CONNECTOR
SW1 POWER SELECTOR SWITCH
D1
CN22
JK3 INTERCOM JACK
CN12
JK1 AUDIO MONITOR JACK
CN21
CN8
CN2
CN3
CN2 GEN-LOCK INPUT CONNECTOR
CN20
CN11
CN1 VIDEO INPUT CONNECTOR
CN4
CN5
CN6
CN9
CN1
CN14
CN17
CN19
CN23
CN24
CN13
COMPONENT SIDE
PATTERN SIDE
E
D
C
B
A
1
2
3
4
5

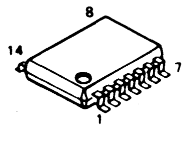
LN11WP23



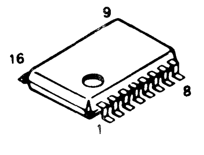
NJM2903M
NJM2904M
NJM387D
TL7700CPS



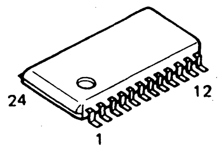
UPC4064G2
MN4071BS
MN4011BS



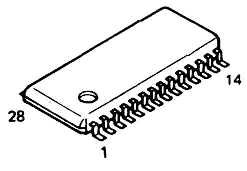
MN4053BS
MN4050BS
MN4538BS
MN4051BS



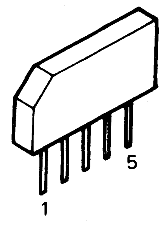
TP4508NP



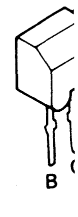
M46015



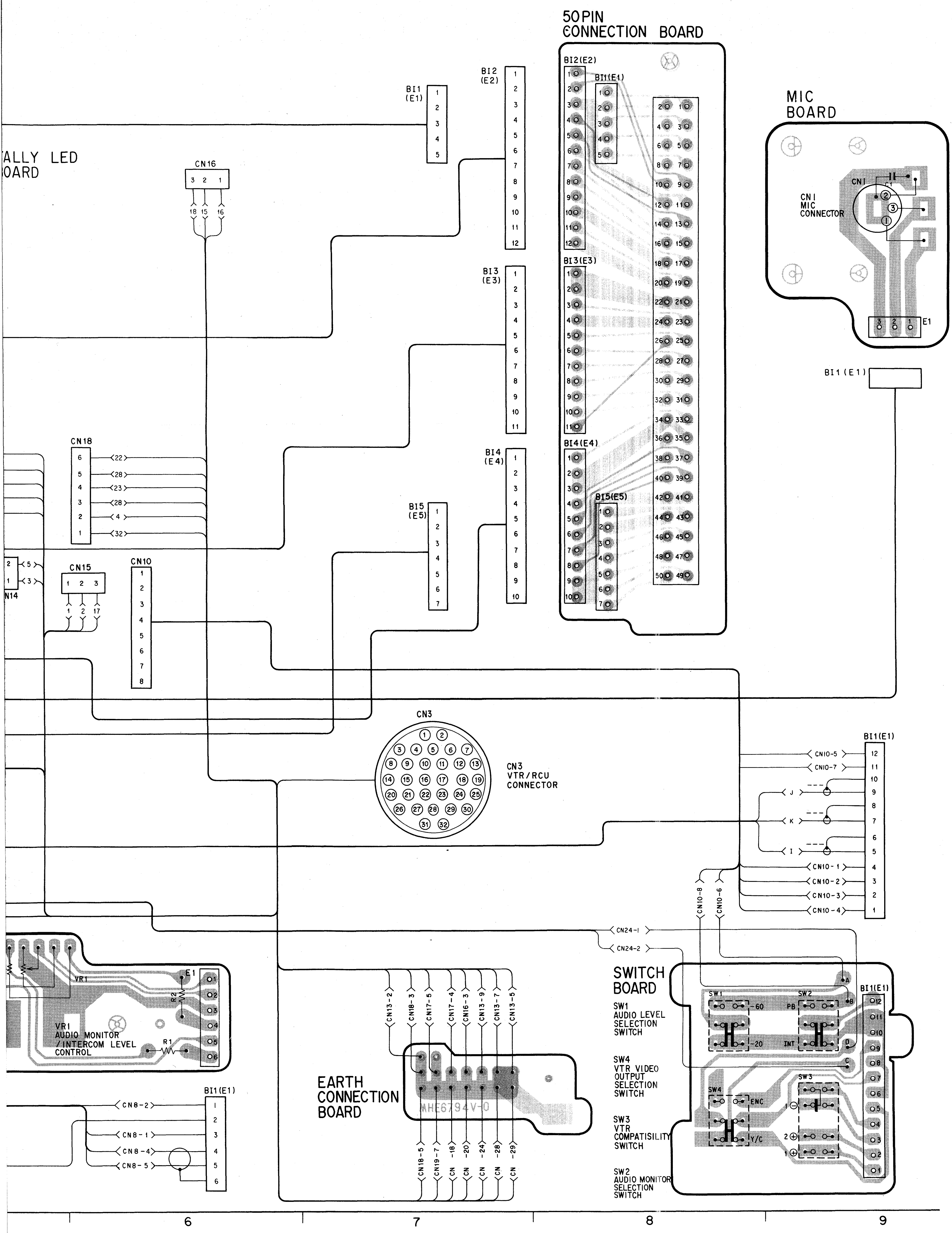
M51957BL



2SD97
2SB79



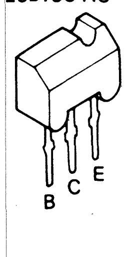
CAMERA ADAPTOR



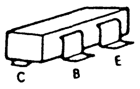
50PIN CONNECTION BOARD
BI2(E2)
BI1(E1)
BI3(E3)
BI4(E4)
BI5(E5)
MIC BOARD
CN1
CN1 MIC CONNECTOR
E1
BI1 (E1)
ALLY LED
OARD
CN16
CN18
CN15
CN10
N14
CN3
CN3 VTR/RCU CONNECTOR
VR1
R2
R1
VR1 AUDIO MONITOR / INTERCOM LEVEL CONTROL
EARTH CONNECTION BOARD
MHE6794V-0
SWITCH BOARD
SW1 AUDIO LEVEL SELECTION SWITCH
SW4 VTR VIDEO OUTPUT SELECTION SWITCH
SW3 VTR COMPATISILITY SWITCH
SW2 AUDIO MONITOR SELECTION SWITCH
-60
-20
PB
INT
ENC
Y/C
CN10-5
CN10-7
CN10-1
CN10-2
CN10-3
CN10-4
CN10-8
CN10-6
CN24-1
CN24-2
CN13-2
CN18-3
CN17-5
CN17-4
CN16-3
CN13-9
CN13-7
CN13-5
CN18-5
CN19-7
CN-18
CN-20
CN-24
CN-28
CN-29
CN8-2
CN8-1
CN8-4
CN8-5
6
7
8
9

IC1	MN4023BS	C3
IC2	NJM2903M	C3
IC3	NJM2904M	B2
IC4	YWNJM387D	C1
IC5	MN4053BS	B2
IC6	YFNJM386D	B2
IC7	MN4053BS	D3
IC8	NJM2903M	D3
IC9	YWUPC4064G2	E3
IC10	YWUPC4064G2	E3
IC11	YWUPC4064G2	E4
IC12	MN4050BS	E3
IC13	YWUPC4064G2	D3
IC14	MN4538BS	D2
IC15	M5231L	D2
IC16	TL7700CPS	D2
IC17	MN4051BS	E3
IC18	MN4051BS	E3
IC19	MN4071BS	F3
IC20	MN4011BS	F2
IC21	MN4050BS	D2
IC22	TP4508NP	E2
IC23	M46015	E2
IC24	NJM2904M	E2
IC25	YWM51957BL	C3
IC26	NJM2903M	C2
Q1	2SD973A-RS	C2
Q2	2SD601-RS	C3
Q3	2SD601-RS	C3
Q4	2SD601-RS	C3
Q5	2SD601-RS	C3
Q6	2SB709-Q	C3
Q7	2SD602-QRS	C3
Q8	2SD601-RS	E2
Q9	2SD601-RS	B2
Q10	2SD602-QRS	C3
Q11	2SD602-QRS	B2
Q12	2SB709-Q	C2
Q13	2SB709-Q	B2
Q14	2SD601-RS	D3
Q15	2SB709-Q	C3
Q17	2SB793-RS	B2
Q18	2SD601-RS	C3
Q19	2SD601-RS	D4
Q20	2SD601-RS	D3
Q21	2SD601-RS	D3
Q25	2SD601-RS	B3
Q26	2SB709-Q	B3
Q27	2SD601-RS	B3
Q28	2SB709-Q	B3
Q29	2SD601-RS	B3
Q30	2SB709-Q	B3
Q31	2SD601-RS	D1
Q32	2SB793-RS	D2
Q33	2SD601-RS	D1
Q34	2SD601-RS	D3
Q35	2SD601-RS	E3
Q36	2SD601-RS	D3
Q37	2SD601-RS	E3
Q38	2SD601-RS	B3
Q39	2SB709-Q	B3
Q40	2SD601-RS	B3
Q41	2SB709-Q	A3
Q42	2SB709-Q	D2
Q43	2SD601-RS	C3
Q44	2SD601-RS	D3
Q45	2SD601-RS	
D1	MA151WK	D3
D2	MA151K	D3
D3	YWERA81-004	E2
D4	YWERA81-004	E2
D5	MA151A	B4
D7	MA4091M	C2
D8	MA151K	D3

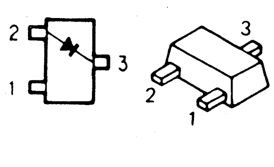
2SD973A-RS
2SB793-RS



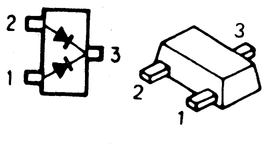
2SD601-QR
2SB709-Q
2SD602-RSTW



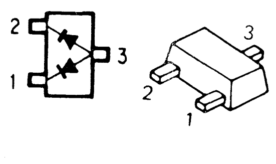
MA151K



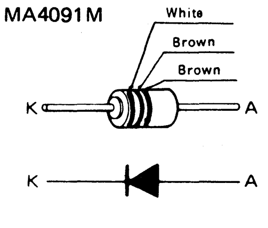
MA151WK



MA151WA

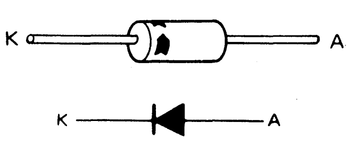


MA4091M

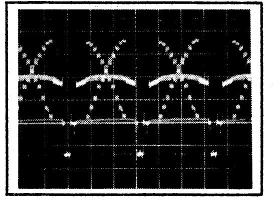


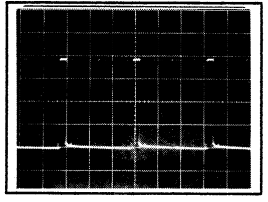
White
Brown
Brown
K
A
K
A

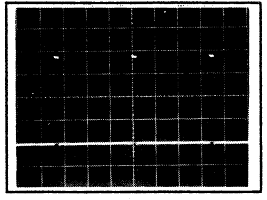
ERA81-004

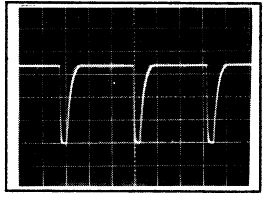


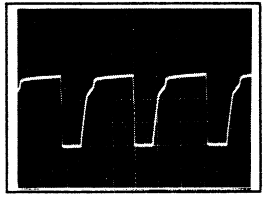
SCHEMATIC DIAGRAM OF 1.

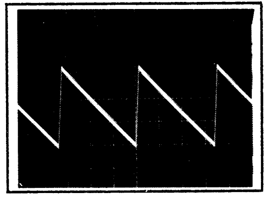

1. 0.2V/DIV, 10µs/DIV

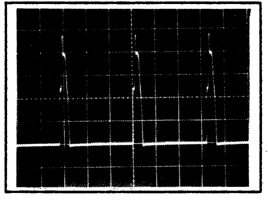

2. 0.2V/DIV, 20µs/DIV


3. 0.2V/DIV, 5µs/DIV

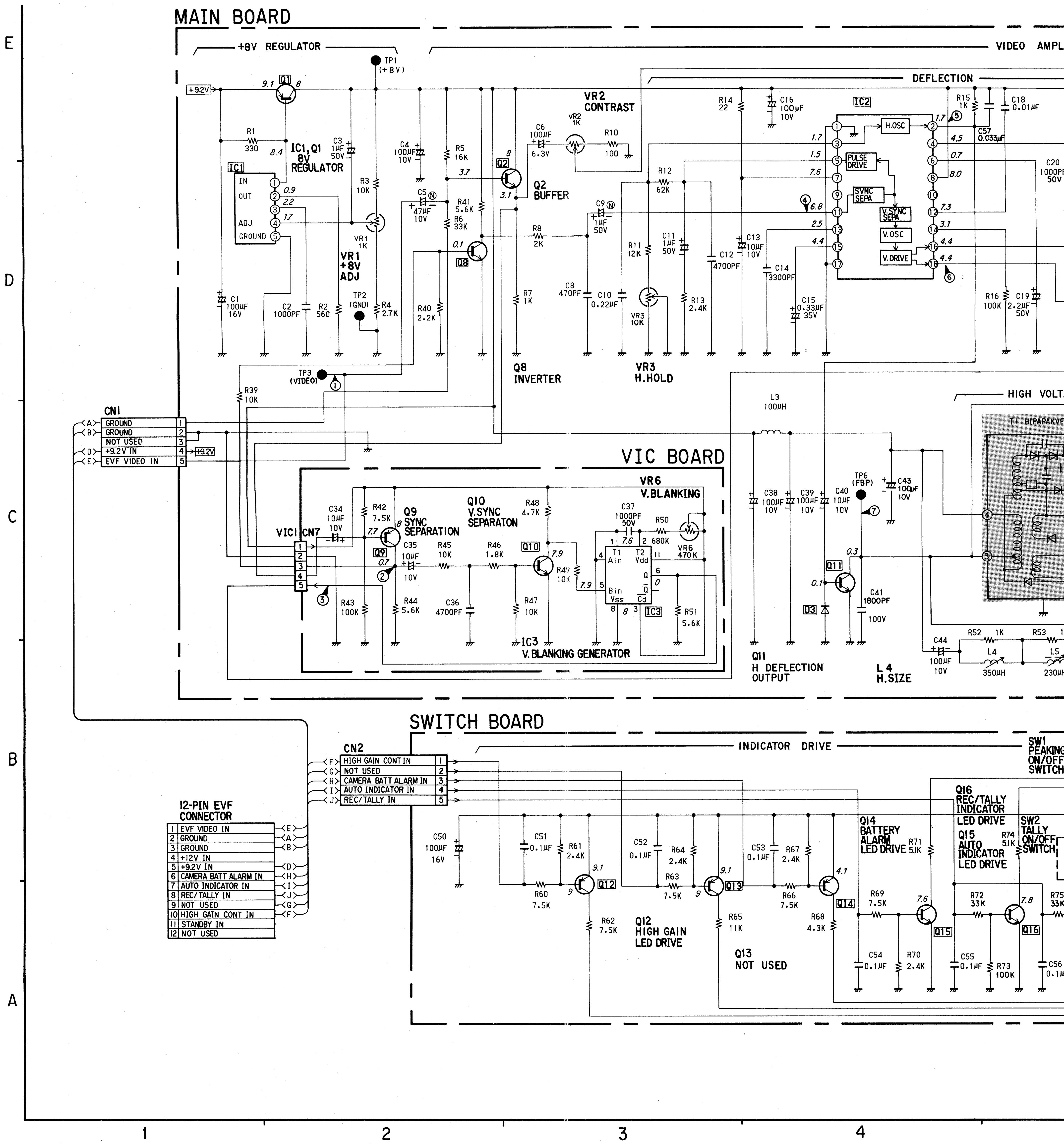

4. 0.2V/DIV, 20µs/DIV


5. 0.5V/DIV, 20µs/DIV


6. 0.1V/DIV, 5µs/DIV


7. 20V/DIV, 20µs/DIV

8. 0.2


MAIN BOARD
+8V REGULATOR
VIDEO AMPL
DEFLECTION
TP1 (+8V)
+9.2V
Q1
R1 330
IC1, Q1 8V REGULATOR
IC1
IN
OUT
ADJ
GROUND
C3 1µF 50V
C4 100µF 10V
R5 16K
R3 10K
C5 47µF 10V
R41 5.6K
R6 33K
VR1 1K
VR1 +8V ADJ
C1 100µF 16V
C2 1000PF
R2 560
TP2 (GND)
R4 2.7K
R40 2.2K
Q2 BUFFER
C6 100µF 6.3V
VR2 CONTRAST
VR2 1K
R10 100
Q8
R7 1K
Q8 INVERTER
R8 2K
C9 1µF 50V
C8 470PF
C10 0.22µF
R12 62K
R11 12K
C11 1µF 50V
VR3 10K
R13 2.4K
VR3 H.HOLD
C12 4700PF
C13 10µF 10V
C14 3300PF
C15 0.33µF 35V
R14 22
C16 100µF 10V
IC2
H.OSC
PULSE DRIVE
SYNC SEPA
V.SYNC SEPA
V.OSC
V.DRIVE
R15 1K
C18 0.01µF
C57 0.033µF
C20 1000PF 50V
R16 100K
C19 2.2µF 50V
TP3 (VIDEO)
R39 10K
CN1
GROUND
GROUND
NOT USED
+9.2V IN
EVF VIDEO IN
VIC BOARD
VIC1
CN7
C34 10µF 10V
R42 7.5K
Q9 SYNC SEPARATION
Q10 V.SYNC SEPARATON
R48 4.7K
VR6 V.BLANKING
C37 1000PF 50V
R50 680K
VR6 470K
C35 10µF 10V
R45 10K
R46 1.8K
R49 10K
R43 100K
R44 5.6K
C36 4700PF
R47 10K
R51 5.6K
IC3
IC3 V.BLANKING GENERATOR
L3 100µH
HIGH VOLT.
T1 HIPAPAKVF
C38 100µF 10V
C39 100µF 10V
C40 10µF 10V
TP6 (FBP)
C43 100µF 10V
Q11
D3
C41 1800PF 100V
Q11 H DEFLECTION OUTPUT
L4 H.SIZE
C44 100µF 10V
R52 1K
R53
L4 350µH
L5 230µH
SWITCH BOARD
CN2
HIGH GAIN CONT IN
NOT USED
CAMERA BATT ALARM IN
AUTO INDICATOR IN
REC/TALLY IN
INDICATOR DRIVE
SW1 PEAKING ON/OFF SWITCH
12-PIN EVF CONNECTOR
1 EVF VIDEO IN
2 GROUND
3 GROUND
4 +12V IN
5 +9.2V IN
6 CAMERA BATT ALARM IN
7 AUTO INDICATOR IN
8 REC/TALLY IN
9 NOT USED
10 HIGH GAIN CONT IN
11 STANDBY IN
12 NOT USED
C50 100µF 16V
C51 0.1µF
R61 2.4K
R60 7.5K
Q12
R62 7.5K
Q12 HIGH GAIN LED DRIVE
C52 0.1µF
R64 2.4K
R63 7.5K
Q13
R65 11K
Q13 NOT USED
C53 0.1µF
R67 2.4K
R66 7.5K
Q14
R68 4.3K
Q14 BATTERY ALARM LED DRIVE
R71 5.1K
Q15 AUTO INDICATOR LED DRIVE
R74 5.1K
Q16 REC/TALLY INDICATOR LED DRIVE
SW2 TALLY ON/OFF SWITCH
R69 7.5K
Q15
C54 0.1µF
R70 2.4K
R72 33K
C55 0.1µF
R73 100K
Q16
R75 33K
C56
E
D
C
B
A
1
2
3
4

< SCHEMATIC DIAGRAM >

Main Board

IC1	M5231L	D1	Q8	2SD601-RS	D2
IC2	BA7125L	D4	Q11	2SD1271A-P	C4
Q1	2SB793-RS	E2	D3	MA151K	C4
Q2	2SD601-RS	D3			
Q4	2SB709-Q	D6			
Q5	2SA1174-FE	D6			
Q6	2SD601-RS	D7			
Q7	2SC2784-FE	D7			

Switch Board

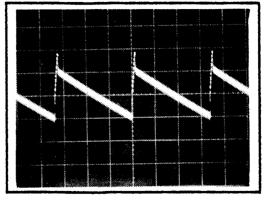
Q12	2SB709-Q	A3	D9	YWGL5HD22	A5
Q13	2SB709-Q	A3	D10	YWGL5HD22	A5
Q14	2SB709-Q	A4			
Q15	2SD601-RS	A4			
Q16	2SD1478-QR	A5			
Q17	2SD1478-QR	A5			
D7	YWGL5HD22	B5			
D8	YWGL5HD22	B5			

VIC Board

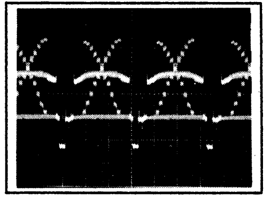
IC3	MN4538BS	C
Q9	2SB709-RSTX	C
Q10	2SD601-RS	C

1.5″ VIEWFINDER WV-VF38

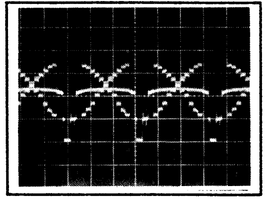
8. 0.2V/DIV , 20μs/DIV

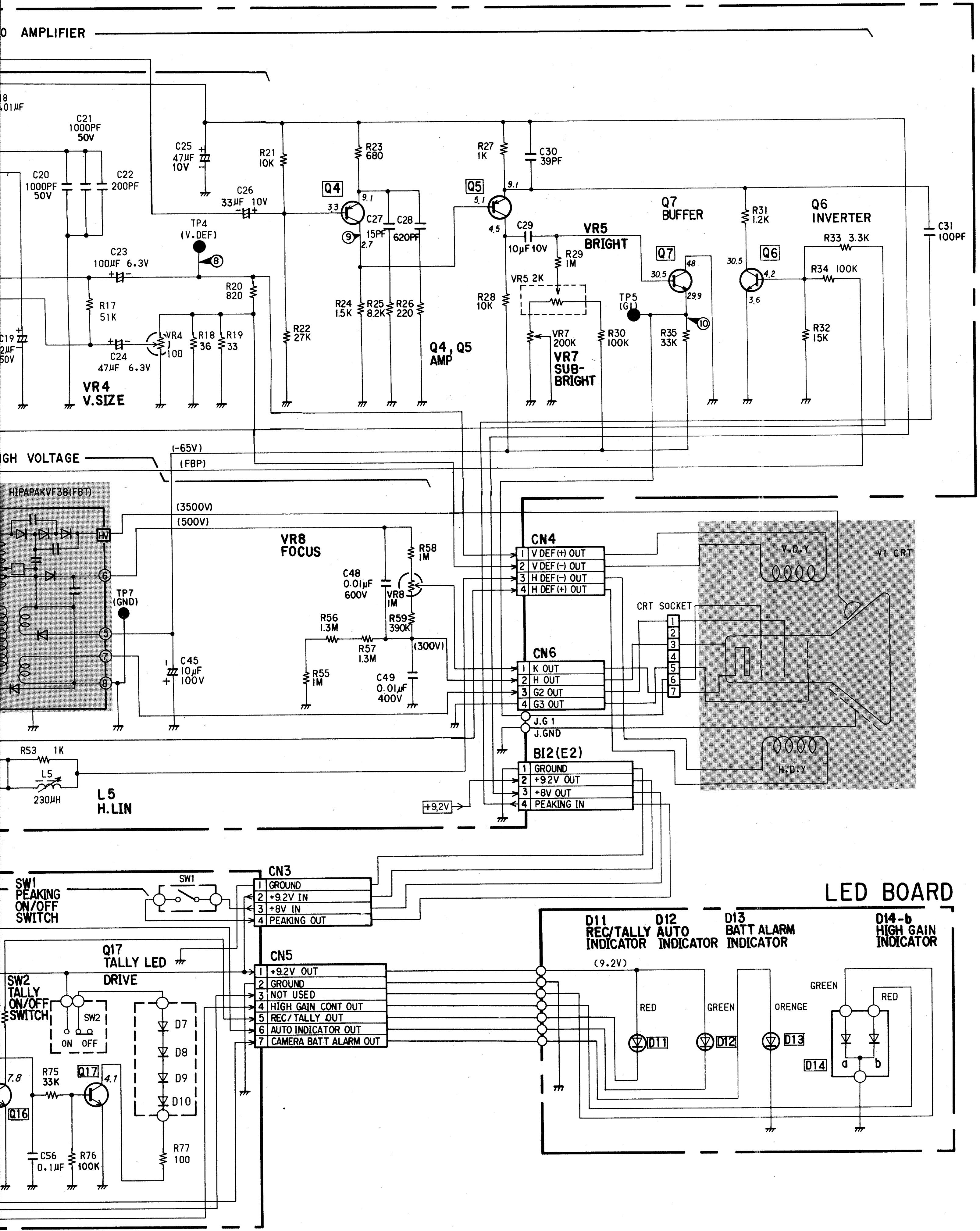


9. 0.2V/DIV , 20μs/DIV



10. 0.5V/DIV , 20μs/DIV





< CONDUCTOR VIEW >

Main Board

IC1	M5231L	B2
IC2	BA7125L	B1
Q1	2SB793-RS	B1
Q2	2SD601-RS	B2
Q4	2SB709-Q	B3
Q5	2SA1174-FE	B3
Q6	2SD601-RS	B2
Q7	2SC2784-FE	A3
Q8	2SD601-RS	B2
Q11	2SD1271A-P	C3
D3	MA151K	C2

Switch Board

Q12	2SB709-Q	B7
Q13	2SB709-Q	B7
Q14	2SB709-Q	B6
Q15	2SD601-RS	A7
Q16	2SD1478-QR	A7
Q17	2SD1478-QR	A7
D7	YWGL5HD22	A6
D8	YWGL5HD22	A6
D9	YWGL5HD22	A6
D10	YWGL5HD22	A6

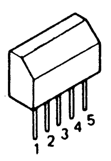
VIC Board

IC3	MN4538BS	B4
Q9	2SB709-RSTX	B4
Q10	2SD601-RS	B4

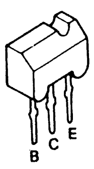
LED Board

D11	SLM13VW	C6
D12	SLM13MW	D6
D13	SLM13DW	D6
D14	SLM23VMW	D6

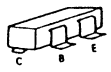
M5231L



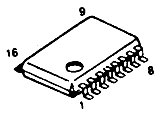
2SB793-RS



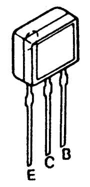
2SB709-RSTX
2SB709-Q
2SD601-QR
2SD1478-QR



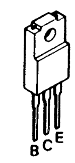
MN4538BS



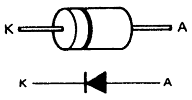
2SA1147-FE
2SC2784-FE



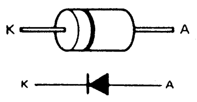
2SD1271A-P



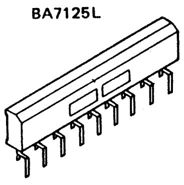
RM1Z



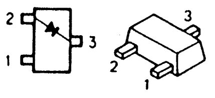
ES01F



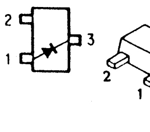
BA7125L



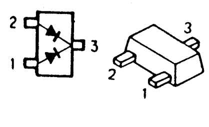
MA151K



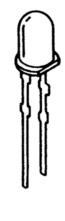
SLM13VW
SLM13DW



SLM23VMW



YWGL5HD22



C3
C2
C3

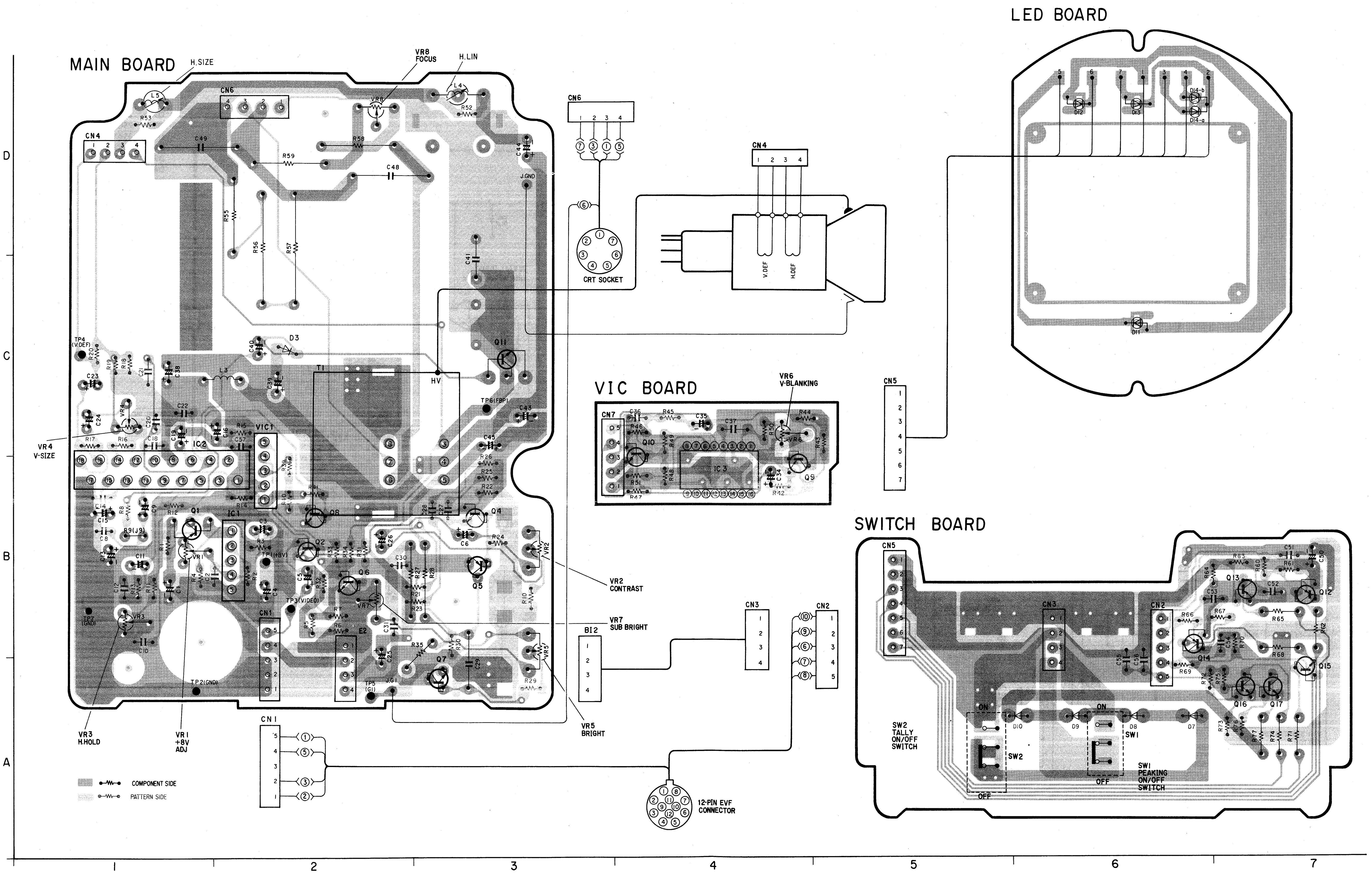
LED Board

D11	SLM13VW	B7
D12	SLM13MW	B7
D13	SLM13DW	B7
D14	SLM23VMW	B8

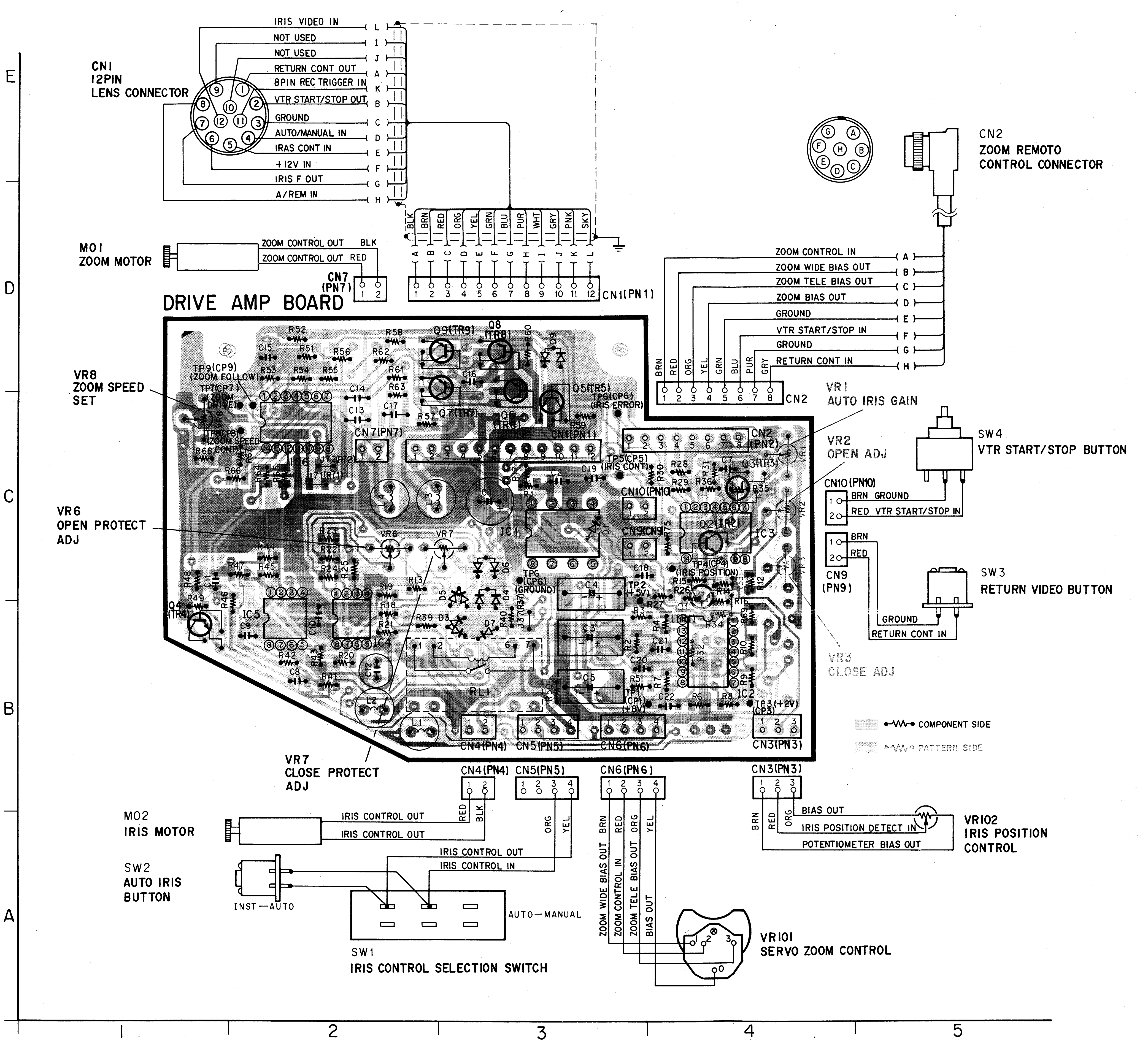
PRODUCT SAFETY NOTE

The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

CONDUCTOR VIEW OF 1.5″ VIEWFINDER WV-VF38

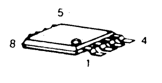

LED BOARD
MAIN BOARD
H.SIZE
VR8 FOCUS
H.LIN
CN6
CN4
CRT SOCKET
V.DEF
H.DEF
VIC BOARD
VR6 V-BLANKING
CN7
IC3
CN5
SWITCH BOARD
VR4 V-SIZE
IC2
VIC1
IC1
T1
HV
D3
TP4 (V.DEF)
TP6(FBP)
TP1(+8V)
TP3(VIDEO)
TP7 (GND)
TP2(GND)
TP5 (G1)
J.GND
J.G1
VR2 CONTRAST
VR7 SUB BRIGHT
VR5 BRIGHT
VR3 H.HOLD
VR1 +8V ADJ
B12
CN1
CN2
CN3
E2
12-PIN EVF CONNECTOR
SW2 TALLY ON/OFF SWITCH
SW1 PEAKING ON/OFF SWITCH
ON
OFF
COMPONENT SIDE
PATTERN SIDE
D
C
B
A
1
2
3
4
5
6
7

CONDUCTOR VIEW OF 12X SERVO CONTROL ZOOM LENS J12X10BKRSM

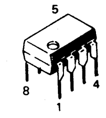

CN1
12PIN
LENS CONNECTOR
IRIS VIDEO IN
NOT USED
NOT USED
RETURN CONT OUT
8PIN REC TRIGGER IN
VTR START/STOP OUT
GROUND
AUTO/MANUAL IN
IRAS CONT IN
+12V IN
IRIS F OUT
A/REM IN
L
I
J
A
K
B
C
D
E
F
G
H
BLK
BRN
RED
ORG
YEL
GRN
BLU
PUR
WHT
GRY
PNK
SKY
M01
ZOOM MOTOR
ZOOM CONTROL OUT BLK
ZOOM CONTROL OUT RED
CN7
(PN7)
CN1(PN1)
DRIVE AMP BOARD
CN2
ZOOM REMOTO
CONTROL CONNECTOR
ZOOM CONTROL IN
ZOOM WIDE BIAS OUT
ZOOM TELE BIAS OUT
ZOOM BIAS OUT
GROUND
VTR START/STOP IN
GROUND
RETURN CONT IN
VR8
ZOOM SPEED
SET
TP9(CP9)
(ZOOM FOLLOW)
TP7(CP7)
(ZOOM DRIVE)
TP8(CP8)
(ZOOM SPEED CONT)
TP6(CP6)
(IRIS ERROR)
TP5(CP5)
(IRIS CONT)
TP4(CP4)
(IRIS POSITION)
TPG
(CPG)
(GROUND)
TP2
(+5V)
TP1
(CP1)
(+8V)
TP3(+2V)
(CP3)
Q9(TR9)
Q8
(TR8)
Q5(TR5)
Q7(TR7)
Q6
(TR6)
Q3(TR3)
Q2(TR2)
Q4
(TR4)
IC1
IC2
IC3
IC4
IC5
IC6
RL1
L1
L2
L3
L4
CN10(PN10)
CN9(CN9)
CN2
(PN2)
VR1
AUTO IRIS GAIN
VR2
OPEN ADJ
VR3
CLOSE ADJ
VR6
OPEN PROTECT
ADJ
VR7
CLOSE PROTECT
ADJ
SW4
VTR START/STOP BUTTON
CN10(PN10)
BRN GROUND
RED VTR START/STOP IN
BRN
RED
CN9
(PN9)
SW3
RETURN VIDEO BUTTON
GROUND
RETURN CONT IN
COMPONENT SIDE
PATTERN SIDE
CN4(PN4)
CN5(PN5)
CN6(PN6)
CN3(PN3)
M02
IRIS MOTOR
IRIS CONTROL OUT
IRIS CONTROL OUT
SW2
AUTO IRIS
BUTTON
INST—AUTO
IRIS CONTROL OUT
IRIS CONTROL IN
AUTO—MANUAL
SW1
IRIS CONTROL SELECTION SWITCH
ZOOM WIDE BIAS OUT
ZOOM CONTROL IN
ZOOM TELE BIAS OUT
BIAS OUT
VR101
SERVO ZOOM CONTROL
BIAS OUT
IRIS POSITION DETECT IN
POTENTIOMETER BIAS OUT
VR102
IRIS POSITION
CONTROL
E
D
C
B
A
1
2
3
4
5

IC1	YWUPC1060-C	B2
IC2	NJM2902M	B3
IC3	NJM2902M	B3
IC4	NJM2904M	B1
IC5	NJM4556M	B1
IC6	NJM2902M	C1
Q1	2SC2712-Y	B3
Q2	2SC2712-Y	B3
Q3	2SK209-GR	B3
Q4	2SC3295-B	B1
Q5	2SC2884-Y	C2
Q6	2SC2884-Y	C2
Q7	2SA1204-Y	C2
Q8	2SC2884-Y	C2
Q9	2SA1204-Y	C2
D1	1SS187	B3
D3	YW1S2835	B2
D4	YW1S2837	B2
D5	YW1S2837	B2
D6	YW1S2835	B2
D7	1SS187	B2
D9	1SS123	C2

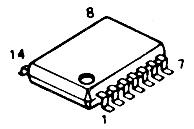
NJM2904M
NJM4556M



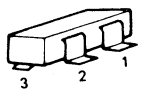
YWLPC1060-C



NJM2902M

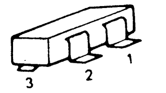


1SS187



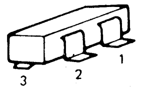
1 : NC
2 : Cathode
3 : Anode

YW1S2835



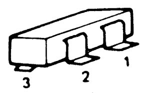
1 : Cathode
2 : Cathode
3 : Anode

YW1S2837



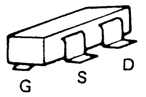
1 : Anode
2 : Anode
3 : Cathode

1SS123

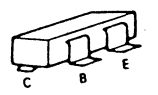


1 : Cathode
2 : Anode
3 : Common

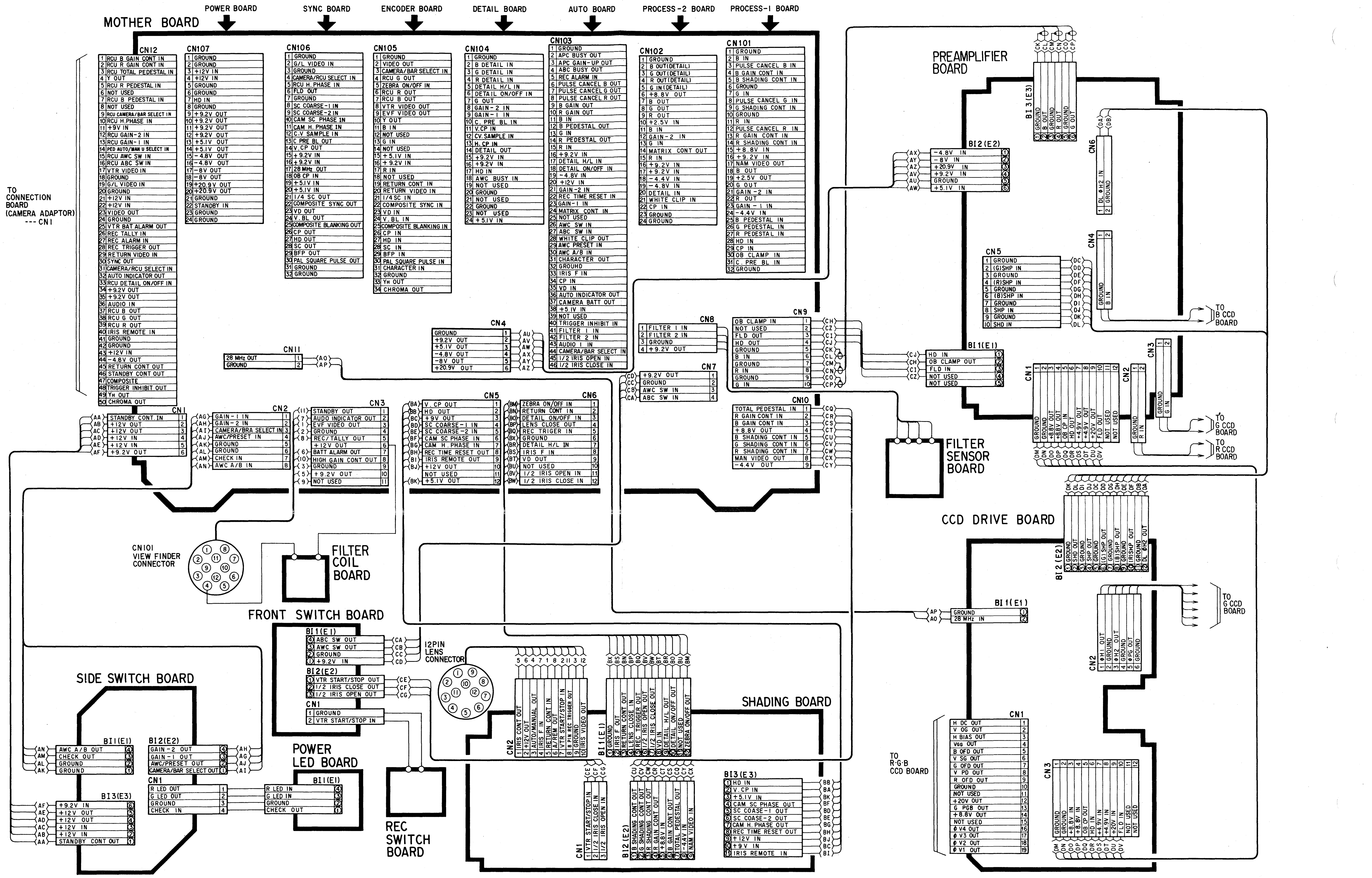
2SK209-GR



2SC2712-Y
2SC3295-B



WIRING DIAGRAM


MOTHER BOARD
POWER BOARD
SYNC BOARD
ENCODER BOARD
DETAIL BOARD
AUTO BOARD
PROCESS-2 BOARD
PROCESS-1 BOARD
CN12
CN107
CN106
CN105
CN104
CN103
CN102
CN101
CN4
CN11
CN8
CN9
CN7
CN10
CN1
CN2
CN3
CN5
CN6
TO CONNECTION BOARD (CAMERA ADAPTOR) --- CN1
PREAMPLIFIER BOARD
BI3(E3)
BI2(E2)
BI1(E1)
FILTER SENSOR BOARD
TO B CCD BOARD
TO G CCD BOARD
TO R CCD BOARD
CCD DRIVE BOARD
TO R·G·B CCD BOARD
CN101 VIEW FINDER CONNECTOR
FILTER COIL BOARD
FRONT SWITCH BOARD
12PIN LENS CONNECTOR
SIDE SWITCH BOARD
POWER LED BOARD
REC SWITCH BOARD
SHADING BOARD

Ⓝ8

Service Manual

Vol. 4

Replacement Parts List
Exploded View

PAL Colour Video Camera

WV-F200 Series

CONTENTS

PARTS LIST

COLOUR VIDEO CAMERA (WV-F200)

Miscellaneous 4-1
Power Board .... 4-2 ~ 4-3
Auto Board .... 4-3 ~ 4-4
Process-1 Board .... 4-4 ~ 4-7
Process-2 Board .... 4-7 ~ 4-9
Detail Board .... 4-9 ~ 4-12
Encoder Board .... 4-12 ~ 4-15
Sync Board .... 4-15 ~ 4-17
Shading Board .... 4-18 ~ 4-19
Mother Board .... 4-19 ~ 4-20
Power LED Board 4-20
Side Switch Board 4-20
Front Switch Board 4-20
REC Switch Board 4-20
Preamplifier Board .... 4-20 ~ 4-22
CCD Drive Board .... 4-22 ~ 4-23
Filter Sensor Board 4-23
Filter Coil Board 4-23

CAMERA ADAPTOR

Miscellaneous 4-23
Main Board .... 4-23 ~ 4-26
50 pin Connector Board 4-26
Switch Board 4-26
Mic Board 4-26
VR Board 4-26
Tally Board 4-26
Accessory Parts/Packaging Parts 4-26

1.5" ELECTRONIC VIEWFINDER (WV-VF38)

Miscellaneous 4-27
Main Board .... 4-27 ~ 4-28
Switch Board 4-28
VIC Board .... 4-28 ~ 4-29
LED Board 4-29
Accessory Parts/Packaging Parts 4-29

12X SERVO CONTROL ZOOM LENS (12X10BKRSM)

Miscellaneous 4-30
Drive Board 4-30
Accessory Parts/Packaging Parts 4-31

TRIPOD MOUNTING ADAPTOR (WV-Q47)

Miscellaneous 4-31
Accessory Parts/Packaging Parts 4-31

MICROPHONE (WV-MC35)

Miscellaneous 4-31
Mic Board 4-31
Accessory Parts/Packaging Parts 4-31

EXPLODED VIEW

Colour Video Camera (WV-F200) 4-32
Camera Adaptor 4-33
1.5" Electronic Viewfinder (WV-VF38) 4-34
12X Servo Control Zoom Lens J12X10BKRSM 4-35
Tripod Mounting Adaptor (WV-Q47) 4-36
Microphone (WV-MC35) 4-37
Packaging 4-38

REPLACEMENT PARTS LIST

Important Notice

1. Components identified by "⚠" mark have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
2. Components identified by "o" mark are new parts used from this model.
3. Printed circuit board assembly with mark (NLA) is no longer available after production discontinuation of the complete set.

REF.NO.	PART NO.	DESCRIPTION
COLOR VIDEO CAMERA WV-F200H		
MISCELLANEOUS		
CN101	o YWDB201N617	12 pin EVF Connector
CN102	o HR10A10R12S	12 pin Lens Connector
R36	o YF2116103JT	Carbon 10K ohms 1/16W
M1	o YWV5EA0417B2	Front Cover
M2	o YWV2KA0167B1	Optical Chassis
M3	o YWV2TA0079B2	Mounting Bracket
M4	o YWV1EA0071A4	Special Screw
M5	o YWV1HA0025A4	Boll
M6	o YWV4JA0146A4	Spring Plate
M7	o YWV2SA0317A3	Mounting Angle for Guid Roller
M8	o YWV2EA0051A4	Guid Roller
M9	o YWV2JA0013A4	Bracing Strut
M10	o YWV1EA0110A4	Special Screw for Guid Roller
M11	o YWV9AA0465AN	Filter WheelAssy
M14	o YWV2HA0479A2	Mounting Plate for CCD Board
M15	o YWV9AA0462AN	Bayonet Mounting Assy
M16	WN-0003	Mount Cap
M17	o YWV2HA0476A2	Shield Parts
M18	o YWV2HA0477B3	Shield Cover for Optical
M19	o YWV2FA0154A4	Cushion for Shield Cover
M20	oYWVAKA0586AN	PRISM & CCD Board Assy
M21	o YWV5EA0418B1	Bottom Cover
M22	o YWV6GA0060B4	Tripod Mounting Plate
M24	o YWV6FA0063A3	Lens Connector Bracket
M25	o YWV2SA0318A4	Mounting Angle A
M26	o YWV2SA0320B4	Mounting Angle B
M27	o YWV2EA0050A2	Lower Guide for Unit Rail
M28	o YWV5VA0047A2	Shoulder Pad
M29	o YWV5EA0423B2	Side Connector Plate Cover
M30	o YWV7SA0847A2	Head Cover Label
M31	o YWV5VB0049A3	Fuse Pad
M32	o YWV6EA0015A3	Lid
M33	o YFV4JA0080A4	Connector Cover Spring
M34	o YFV1HA0015A4	Connector for Cover Pin
M36	o YWV5EA0424B3	Filter Cover
M38	o YWV5KA0084A3	Filter Case
M39	o YWV4JA0156B4	Spring for Filter
M40	o YWV5EA0421A1	Right Side Cover
M41	o YWV2HA0478A4	Magnet Shield Wire Nets
M42	o YWV2FA0152A4	Cushion for Board
M43	o YWV7SA0859A4	Control Indication Label
M44	o YWV4JA0155A4	Spring
M45	o YWV5ED0422A1	Left Side Cover
M46	YWV7PA0062A4	Badge
M47	o YWV2TA0083A3	Mounting Bracket for Mic Bolt
M48	YFV1JA0001B4	Bolt
M49	o YWV2TC0067B3	Mic Holder Base
M51	o YFV5VA0038A3	Mic Pad(×2)
M52	o YWV2TC0066A3	Mic Holder Bracket
M53	YFV1FA0021B4	Nut
M55	o YWV5EA0419B1	Upper Cover
M56	o YWV2EA0049A2	Upper Guide for Unit Rail
M58	o YWV5EA0463A2	Rear Cover
M59	YWV2EA0056A4	sho Guide
M60	o YWV6AA0016B1	Handle
M61	o YWV5EA0425B2	Cover
M62	o YWV1KA0039A4	Polyethlene Washer
M63	o YWV1EA0070A3	Special Screw for EFV Mounting
M64	o YWV2EA0052A4	Guide Shaft
M65	o YWV1KA0041A4	Shaft Washer
M66	o YWV6FA0066A3	EVF Bracket
M67	o YWV4JA0147A4	Spring Coil
M69	YFV6JA0026A4	Push Button
M71	o YWV6GA0061A4	Blank Plate
M73	YWV7MA0269A4	Connector Caution Label
M75	YWV7MA0099A4	Caution Label
M78	YWV2VA0018B3	Barrier
M79	YWV2VA0017A4	Barrier(×5)
M82 ⚠	o YWV7QA1632A4	Main Label
M85	o YWV2PA0225A4	Insulator Specer
M91	o YWV5EA0420A2	Front Plate Cover
M92	YWV6JA0041A4	VTR Button
M93	YW5943001901	Filter

POWER BOARD

REF.NO.	PART NO.	DESCRIPTION	
PCB1 (NLA)	oYWVKBF200E1A	Printed Circuit Board Assy	
IC1	NJM2901M	IC	
IC2,3	YWUPC4064G2	IC	
IC4	NJM2901M	IC	
Q1	2SB709-Q	Transistor	
Q2	2SD601-RS	Transistor	
Q3	2SB709-Q	Transistor	
Q4	2SJ122	Transistor	
Q5,6	2SA1244Y	Transistor	
Q7	2SD601-RS	Transistor	
Q9	2SC3074Y	Transistor	
Q10	2SA1244Y	Transistor	
Q11	2SD601-RS	Transistor	
Q12	2SA1244Y	Transistor	
Q13	2SD601-RS	Transistor	
D1	MA151K	Diode	
D2	MA1062-L	Diode	
D3	MA151WK	Diode	
D4	YWERA81004	Diode	
D5	YWLM385Z2.5V	Diode	
D6,7	MA151K	Diode	
D8-11	YWERA81004	Diode	
D12	V03G	Diode	
D13	YWERA81004	Diode	
R1	ERX1SJR20	Metal	0.2 ohms 1W
R2	YF2116103JT	Carbon	10K ohms 1/16W
R3	YF2116562JT	Carbon	5.6K ohms 1/16W
R5	YF2116102GT	Carbon	1K ohms 1/16W
R6	YF2116330JT	Carbon	33 ohms 1/16W
R7	YF2116222GT	Carbon	2.2K ohms 1/16W
R8	YF2116333GT	Carbon	33K ohms 1/16W
R9	YF2116154JT	Carbon	150K ohms 1/16W
R10	YF2116562JT	Carbon	5.6K ohms 1/16W
R11	YF2116333GT	Carbon	33K ohms 1/16W
R12	YF2116682JT	Carbon	6.8K ohms 1/16W
R13	YF2116182GT	Carbon	1.8K ohms 1/16W
R14	YF2116563JT	Carbon	56K ohms 1/16W
R15	YF2116562JT	Carbon	5.6K ohms 1/16W
R16	YF2116473GT	Carbon	47K ohms 1/16W
R17	YF2116333GT	Carbon	33K ohms 1/16W
R18,19	YF21162R2JT	Carbon	2.2 ohms 1/16W
R20	YF2116560JT	Carbon	56 ohms 1/16W
R22,23	YF2116562JT	Carbon	5.6K ohms 1/16W
R24	YF2116222GT	Carbon	2.2K ohms 1/16W
R25	YF2116562JT	Carbon	5.6K ohms 1/16W
R26	YF2116562GT	Carbon	5.6K ohms 1/16W
R27	YF2116512GT	Carbon	5.1K ohms 1/16W
R28	YF2116182GT	Carbon	1.8K ohms 1/16W
R29	YW2116202GT	Carbon	2K ohms 1/16W
R30,31	YF2116562JT	Carbon	5.6K ohms 1/16W
R32	YF2116682JT	Carbon	6.8K ohms 1/16W
R33	YF2116103JT	Carbon	10K ohms 1/16W
R34	YF2116333GT	Carbon	33K ohms 1/16W
R35	YF2116561JT	Carbon	560 ohms 1/16W
R36	YF2116221JT	Carbon	220 ohms 1/16W
R37	ERDS2TJ821	Carbon	820 ohms 1/4W
R38	YF2116183GT	Carbon	18K ohms 1/16W
R39,40	YF2116562JT	Carbon	5.6K ohms 1/16W
R42	YF2116103JT	Carbon	10K ohms 1/16W
R43	YF2116562JT	Carbon	5.6K ohms 1/16W
R45	YF2116332JT	Carbon	3.3K ohms 1/16W
R46	YF2116392JT	Carbon	3.9K ohms 1/16W
R47	YF2116153JT	Carbon	15K ohms 1/16W
R48,49	YF2116562JT	Carbon	5.6K ohms 1/16W
R50,51	YF2116122GT	Carbon	1.2K ohms 1/16W
R52,53	YF2116562JT	Carbon	5.6K ohms 1/16W
R54	YF2116333GT	Carbon	33K ohms 1/16W
R55	YF2116221JT	Carbon	220 ohms 1/16W
R56	ERDS2TJ821	Carbon	820 ohms 1/4W
R57	YF2116202JT	Carbon	2K ohms 1/16W
R58,59	YF2116103JT	Carbon	10K ohms 1/16W
R60	YF2116562JT	Carbon	5.6K ohms 1/16W
R61	YF2116333GT	Carbon	33K ohms 1/16W
R62	YF2116221JT	Carbon	220 ohms 1/16W
R63	ERDS2TJ821	Carbon	820 ohms 1/4W
R64	YF2116202JT	Carbon	2K ohms 1/16W
R65	YF2116682JT	Carbon	6.8K ohms 1/16W
R66	YF2116562JT	Carbon	5.6K ohms 1/16W
R68,69	YF2116392JT	Carbon	3.9K ohms 1/16W
R70	YF2116562JT	Carbon	5.6K ohms 1/16W
R72	YF2116123JT	Carbon	12K ohms 1/16W
R73	YF2116562JT	Carbon	5.6K ohms 1/16W
R74	YF2116222GT	Carbon	2.2K ohms 1/16W
VR1,3	YFH0622A1K	Variable Resistor	1K ohms
VR4-6	YFH0622A1K	Variable Resistor	1K ohms
C1	ECEA1CKS330	Electrolytic	33 µF 16V
C2	ECEA1EK470	Electrolytic	47 µF 25V
C3	YF426104XKS	Ceramic	0.1 µF
C4	YF400100CHDT	Ceramic	10 pF
C5	YF400681CHJT	Ceramic	680 µF 50V
C6	YF426223XKS	Ceramic	0.022 µF 50V
C7	ECEA1EU471	Electrolytic	470 µF 25V
C8	ECEA1ESS101	Electrolytic	100 µF 25V
C11,13	ECEA1CF101	Electrolytic	100 µF 16V
C15	YF426104XKS	Ceramic	0.1 µF
C16	ECSF1AE225	Tantalum	2.2 µF 10V
C17	YF426104XKS	Ceramic	0.1 µF
C18	YF426103XMS	Ceramic	0.01 µF
C19	ECEA1ESS101	Electrolytic	100 µF 25V
C20	YF400102XKT	Ceramic	1000 pF
C21	ECEA1HKSR47	Electrolytic	0.47 µF 50V (KS)
C22,23	ECEA1AF101	Electrolytic	100 µF 10V
C24	YF426104XKS	Ceramic	0.1 µF
C25	ECEA1ESS101	Electrolytic	100 µF 25V
C26,27	ECEA1EF101	Electrolytic	100 µF 25V
C28	ECEA1HKSR47	Electrolytic	0.47 µF 50V (KS)

REF.NO.	PART NO.	DESCRIPTION	
C29	YF426103XMS	Ceramic	0.01 µF
C30	ECEA1ESS101	Electrolytic	100 µF 25V
C31	YF400102XKT	Ceramic	1000 pF
C33,34	ECEA1AF101	Electrolytic	100 µF 10V
C35	YF426104XKS	Ceramic	0.1 µF
C36	YF426103XMS	Ceramic	0.01 µF
C37	ECEA1ESS101	Electrolytic	100 µF 25V
C40,41	ECEA1AF101	Electrolytic	100 µF 10V
C42,43	YF426104XKS	Ceramic	0.1 µF
C45	YF426104XKS	Ceramic	0.1 µF
L1	YFLH10D500K	Coil	50 µH
L2	YFLH10D101K	Coil	100 µH
L3	YFLH10D500K	Coil	50 µH
L4-15	YFPF8201K	Coil	200 µH
CN1,2	P/N69301-006	12 pin Connector	
TP1-6	YW32BM7R5	Test pin	
TP13	YW32BM7R5	Test pin	

AUTO BOARD

REF.NO.	PART NO.	DESCRIPTION	
PCB2 (NLA)	o YWVKCF200E1A	Printed Circuit Board Assy	
IC1	MN1758CVW2	IC	
IC2	YWM51957BL	IC	
IC3	UPD6142G-101	IC	
IC4-7	AN90B82S	IC	
IC8-10	MN4053BS	IC	
IC11	BA226AF	IC	
IC13	YWUPC4062G2	IC	
IC14	NJM2903M	IC	
IC15-17	YWUPC4064G2	IC	
IC18,19	MN4051BS	IC	
IC20	NJM2903M	IC	
Q1	2SB970-QRS	Transistor	
Q2-4	2SD601-RS	Transistor	
Q5	2SB709-Q	Transistor	
Q6,11	2SD601-RS	Transistor	
Q12-25	2SD601-RS	Transistor	
Q26,27	2SB709-Q	Transistor	
Q28-31	2SD601-RS	Transistor	
Q40	2SD601-RS	Transistor	
D1	MA151K	Diode	
D2,3	MA151WK	Diode	
D4,5	MA151K	Diode	
D6	MA151WA	Diode	
D7,10	MA151K	Diode	
D11	MA151K	Diode	
R1-8	YF2116333GT	Carbon	33K ohms 1/16W
R9,10	YF2116104JT	Carbon	100K ohms 1/16W
R13,14	YF2116333GT	Carbon	33K ohms 1/16W
R15	YF2116104JT	Carbon	100K ohms 1/16W
R16	YF2116204GT	Carbon	200K ohms 1/16W
R17-20	YF2116103JT	Carbon	10K ohms 1/16W
R28	YF2116333GT	Carbon	33K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R29	YF2116223JT	Carbon	22K ohms 1/16W
R33	YF2116222GT	Carbon	2.2K ohms 1/16W
R34	YF2116391JT	Carbon	390 ohms 1/16W
R35	YF2116152JT	Carbon	1.5K ohms 1/16W
R36,37	YF2116103GT	Carbon	10K ohms 1/16W
R38	YF2116123GT	Carbon	12K ohms 1/16W
R40	YF2116472GT	Carbon	4.7K ohms 1/16W
R42	YF2116432GT	Carbon	4.3K ohms 1/16W
R43	YF2116392JT	Carbon	3.9K ohms 1/16W
R44	YF2116223JT	Carbon	22K ohms 1/16W
R45	YF2116102GT	Carbon	1K ohms 1/16W
R46	YF2116822JT	Carbon	8.2K ohms 1/16W
R47	YF2116222GT	Carbon	2.2K ohms 1/16W
R48	YF2116102GT	Carbon	1K ohms 1/16W
R49	YF2116562JT	Carbon	5.6K ohms 1/16W
R50	YF2116103JT	Carbon	10K ohms 1/16W
R52-54	YF2116223JT	Carbon	22K ohms 1/16W
R55	YF2116333GT	Carbon	33K ohms 1/16W
R56	YF2116562JT	Carbon	5.6K ohms 1/16W
R57	YF2116272GT	Carbon	2.7K ohms 1/16W
R58	YF2116821GT	Carbon	820 ohms 1/16W
R59	YF2116241JT	Carbon	24 ohms 1/16W
R60,61	YF2116151GT	Carbon	150 ohms 1/16W
R62	YF2116242GT	Carbon	2.4K ohms 1/16W
R63,64	YF2116223JT	Carbon	22K ohms 1/16W
R65-68	YF2116103JT	Carbon	10K ohms 1/16W
R69	YF2116913JT	Carbon	91K ohms 1/16W
R72	YF2116103GT	Carbon	10K ohms 1/16W
R73	YF2116182GT	Carbon	1.8K ohms 1/16W
R74	YF2116222GT	Carbon	2.2K ohms 1/16W
R75	YF2116103JT	Carbon	10K ohms 1/16W
R76	YF2116182GT	Carbon	1.8K ohms 1/16W
R77	YF2116222GT	Carbon	2.2K ohms 1/16W
R78	YF2116103JT	Carbon	10K ohms 1/16W
R79	YF2116182GT	Carbon	1.8K ohms 1/16W
R80	YF2116222GT	Carbon	2.2K ohms 1/16W
R81	YF2116103JT	Carbon	10K ohms 1/16W
R82	YF2116470JT	Carbon	47 ohms 1/16W
R83	YF2116223JT	Carbon	22K ohms 1/16W
R84,85	YF2116182GT	Carbon	1.8K ohms 1/16W
R86,87	YF2116332GT	Carbon	3.3K ohms 1/16W
R88	YF2116222GT	Carbon	2.2K ohms 1/16W
R89	YF2116101JT	Carbon	100 ohms 1/16W
R90	YF2116333GT	Carbon	33K ohms 1/16W
R91	YF2116222GT	Carbon	2.2K ohms 1/16W
R92	YF2116101JT	Carbon	100 ohms 1/16W
R93	YF2116333GT	Carbon	33K ohms 1/16W
R96	YF2116472GT	Carbon	4.7K ohms 1/16W
R98	YF2116822JT	Carbon	8.2K ohms 1/16W
R99	YF2116103JT	Carbon	10K ohms 1/16W
R100	YF2116104JT	Carbon	100K ohms 1/16W
R101	YF2116102GT	Carbon	1K ohms 1/16W
R102	YF2116105GT	Carbon	1M ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R103	YF2116123GT	Carbon	12K ohms 1/16W
R104	YF2116392GT	Carbon	3.9K ohms 1/16W
R105	YF2116103GT	Carbon	10K ohms 1/16W
R106	YF2116622GT	Carbon	6.2 ohms 1/16W
R112	YF2116105GT	Carbon	1M ohms 1/16W
R113	YF2116223GT	Carbon	22K ohms 1/16W
R114	YF2116682GT	Carbon	6.8K ohms 1/16W
R115	YF2116103JT	Carbon	10K ohms 1/16W
R116	YF2116272JT	Carbon	2.7K ohms 1/16W
R118	YF2116204GT	Carbon	200K ohms 1/16W
R120,121	YF2116103JT	Carbon	10K ohms 1/16W
R130	YF2116104JT	Carbon	100K ohms 1/16W
R131-137	YF2116224JT	Carbon	220K ohms 1/16W
R138	YF2116104JT	Carbon	100K ohms 1/16W
R139-143	YF2116224JT	Carbon	220K ohms 1/16W
R144	YF2116103JT	Carbon	10K ohms 1/16W
R145	YF2116104JT	Carbon	100K ohms 1/16W
R146	YF2116103JT	Carbon	10K ohms 1/16W
R147	YF2116104JT	Carbon	100K ohms 1/16W
R148	YF2116103JT	Carbon	10K ohms 1/16W
R149	YF2116104JT	Carbon	100K ohms 1/16W
R150	YF2116103JT	Carbon	10K ohms 1/16W
R151	YF2116104JT	Carbon	100K ohms 1/16W
R152	YF2116103JT	Carbon	10K ohms 1/16W
R153	YF2116104JT	Carbon	100K ohms 1/16W
R154	YF2116103JT	Carbon	10K ohms 1/16W
R155	YF2116104JT	Carbon	100K ohms 1/16W
R156	YF2116472GT	Carbon	4.7K ohms 1/16W
R158	YF2116103JT	Carbon	10K ohms 1/16W
R162	YF2116104JT	Carbon	100K ohms 1/16W
R163	YF2116101JT	Carbon	100 ohms 1/16W
R166	YF2116332JT	Carbon	3.3K ohms 1/16W
R167	YF2116153JT	Carbon	15K ohms 1/16W
VR1-4	YFH0622A2R2K	Variable Resistor	2.2K ohms
VR7	EVM8AGA00B13	Variable Resistor	1K ohms
Z1	YFRKM10L104F	Block Resistor	
C1	ECEA0JS470	Electrolytic	47 µF 6.3V
C2	ECEA0JKS330	Electrolytic	33 µF 6.3V
C3-9	YW426563XKT	Ceramic	0.056 µF
C10	ECEA0JS470	Electrolytic	47 µF 6.3V
C12	ECEA0JK221	Electrolytic	220 µF 6.3V
C16	ECEA0JS470	Electrolytic	47 µF 6.3V
C17	YF400200CHJT	Ceramic	20 pF
C18	YF400181CHJT	Ceramic	180 pF
C19	ECEA0JS470	Electrolytic	47 µF 6.3V
C20,21	YF400102XKT	Ceramic	1000 pF
C24	YF426104XKS	Ceramic	0.1 µF
C25	ECEA1CKS100	Electrolytic	10 µF 16V
C26	YF426104XKS	Ceramic	0.1 µF
C27	ECEA1CKS100	Electrolytic	10 µF 16V
C28	YF426104XKS	Ceramic	0.1 µF
C29	ECEA0JS470	Electrolytic	47 µF 6.3V
C30	ECEA0GKS470	Electrolytic	47 µF 4V
C31,32	ECSF1HE105	Tantalum	1 µF 50V
C33	ECEA0JS470	Electrolytic	47 µF 6.3V
C34,35	YF426104XKS	Ceramic	0.1 µF
C36	ECEA1HK010	Electrolytic	1 µF 50V
C37	ECEA0JS470	Electrolytic	47 µF 6.3V
C38	ECEA1HKS3R3	Electrolytic	3.3 µF 50V (KS)
C41,42	YF400103XKT	Ceramic	0.01 µF
C43	YF400104FZT	Ceramic	0.1 µF
C45	YF400101CHJT	Ceramic	100 pF
C50	YF400273XKT	Ceramic	0.027 µF
C51	ECEA1AKS330	Electrolytic	33 µF 10V
C53	YF400102XKT	Ceramic	1000 pF
CT1	YWCDX20APS	Trimmer Capacitor	
L1	YWEL05SI121K	Coil	120 µH
L2	EL05SI101K	Coil	100 µH
L3	EL05SI560K	Coil	56 µH
SW2,3	YWSKHHLN	Special Switch	
SW4	YWSSS21200	Slide Switch	
X1	EF0-FC8004	Crystal Oscillator	
BAT1	BR2325-1HM	Battery	
J1,2	YF21160R00T	Jumper Resistor	
J5,6,21	YF21160R00T	Jumper Resistor	
J94,97	YF21160R00T	Jumper Resistor	
CN1	P/N69301-009	18 pin Connector	
	P/N69301-005	10 pin Connector	
	P/N69301-009	18 pin Connector	
TP1-6	YW32BM7R5	Test pin	

PROCESS-1 BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB3 (NLA)	o YWVKBF50HP2A	Printed Circuit Board Assy
IC1	MN4053BS	IC
IC2	NJM4558M	IC
IC3	AN90B01S	IC
IC5	MN4053BS	IC
IC6	AN90B01S	IC
IC7	MN4053BS	IC
IC8	NJM4558M	IC
IC9	AN90B01S	IC
IC10	MN4093BS	IC
Q1,2	2SC2404-CDTW	Transistor
Q3	2SD601-RS	Transistor
Q4	2SC2404-CDTW	Transistor
Q5	2SA1034-ST	Transistor
Q6	2SB709-Q	Transistor
Q7	2SD601-RS	Transistor
Q8	2SC2404-CDTW	Transistor
Q9,10	2SC2405-RS	Transistor
Q11	2SC2404-CDTW	Transistor
Q12,13	2SA1022-C	Transistor
Q14,15	2SC2404-CDTW	Transistor

REF.NO.	PART NO.	DESCRIPTION	
Q16	2SD601-RS	Transistor	
Q17	2SC2404-CDTW	Transistor	
Q18	2SD601-RS	Transistor	
Q19	2SB709-Q	Transistor	
Q20-22	2SC2404-CDTW	Transistor	
Q23	2SA1022-C	Transistor	
Q24	2SB709-Q	Transistor	
Q25	2SD601-RS	Transistor	
Q26,27	2SC2404-CDTW	Transistor	
Q28	2SD601-RS	Transistor	
Q29	2SC2404-CDTW	Transistor	
Q30	2SA1034-ST	Transistor	
Q31	2SB709-Q	Transistor	
Q32	2SD601-RS	Transistor	
Q33	2SC2404-CDTW	Transistor	
Q34,35	2SC2405-RS	Transistor	
Q36	2SC2404-CDTW	Transistor	
Q37,38	2SA1022-C	Transistor	
Q39,40	2SC2404-CDTW	Transistor	
Q41	2SD601-RS	Transistor	
Q42	2SC2404-CDTW	Transistor	
Q43	2SD601-RS	Transistor	
Q44	2SB709-Q	Transistor	
Q45-47	2SC2404-CDTW	Transistor	
Q48	2SA1022-C	Transistor	
Q49	2SB709-Q	Transistor	
Q50	2SD601-RS	Transistor	
Q51,52	2SC2404-CDTW	Transistor	
Q53	2SD601-RS	Transistor	
Q54	2SC2404-CDTW	Transistor	
Q55	2SA1034-ST	Transistor	
Q56	2SB709-Q	Transistor	
Q57	2SD601-RS	Transistor	
Q58	2SC2404-CDTW	Transistor	
Q59,60	2SC2405-RS	Transistor	
Q61	2SC2404-CDTW	Transistor	
Q62,63	2SA1022-C	Transistor	
Q64,65	2SC2404-CDTW	Transistor	
Q66	2SD601-RS	Transistor	
Q67	2SC2404-CDTW	Transistor	
Q68	2SD601-RS	Transistor	
Q69	2SB709-Q	Transistor	
Q70-72	2SC2404-CDTW	Transistor	
Q73	2SA1022-C	Transistor	
Q74	2SB709-Q	Transistor	
Q75	2SD601-RS	Transistor	
Q76-80	2SB709-Q	Transistor	
D1	MA151WA	Diode	
R1	YF2116102GT	Carbon	1K ohms 1/16W
R2	YF2116101JT	Carbon	100 ohms 1/16W
R3	YF2116472GT	Carbon	4.7K ohms 1/16W
R4	YF2116561JT	Carbon	560 ohms 1/16W
R6	YF2116472GT	Carbon	4.7K ohms 1/16W
R7	YF2116333GT	Carbon	33K ohms 1/16W
R8	YF2116332JT	Carbon	3.3K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R9	YF2116222GT	Carbon	2.2K ohms 1/16W
R10	YF2116101JT	Carbon	100 ohms 1/16W
R11	YF2116682JT	Carbon	6.8K ohms 1/16W
R12	YF2116223JT	Carbon	22K ohms 1/16W
R13,14	YF2116103JT	Carbon	10K ohms 1/16W
R15	YF2116222GT	Carbon	2.2K ohms 1/16W
R16	YF2116103JT	Carbon	10K ohms 1/16W
R17	YF2116105GT	Carbon	1M ohms 1/16W
R18	YF2116333GT	Carbon	33K ohms 1/16W
R19	YF2116104JT	Carbon	100K ohms 1/16W
R20	YF2116333GT	Carbon	33K ohms 1/16W
R24	YF2116101JT	Carbon	100 ohms 1/16W
R25	YF2116472GT	Carbon	4.7K ohms 1/16W
R26	YF2116473GT	Carbon	47K ohms 1/16W
R27,28	YF2116102GT	Carbon	1K ohms 1/16W
R29,30	YWR1220P332D	Metal	3.3K ohms
R31-34	YWR1220P101D	Metal	100 ohms
R35,36	YF2116473GT	Carbon	47K ohms 1/16W
R37	YF2116472GT	Carbon	4.7K ohms 1/16W
R38,39	YF2116334JT	Carbon	330K 1/16W
R41	YWR1220P332D	Metal	3.3K ohms
R42	YWR1220P182D	Metal	1.8K ohms
R44	YWR1220P511D	Metal	510 ohms
R46	YF2116472GT	Carbon	4.7K ohms 1/16W
R47	YF2116102GT	Carbon	1K ohms 1/16W
R48	YF2116103JT	Carbon	10K ohms 1/16W
R49-52	YWR1220P102D	Metal	1K ohms
R53	YF2116222GT	Carbon	2.2K ohms 1/16W
R54	YF2116472GT	Carbon	4.7K ohms 1/16W
R55	YF2116333GT	Carbon	33K ohms 1/16W
R56	YF2116222GT	Carbon	2.2K ohms 1/16W
R57	YF2116103JT	Carbon	10K ohms 1/16W
R58	YF2116101JT	Carbon	100 ohms 1/16W
R59	YF2116682JT	Carbon	6.8K ohms 1/16W
R60	YF2116223JT	Carbon	22K ohms 1/16W
R61	YF2116472GT	Carbon	4.7K ohms 1/16W
R62	YF2116102GT	Carbon	1K ohms 1/16W
R63	YF2116152JT	Carbon	1.5K ohms 1/16W
R64,65	YF2116101JT	Carbon	100 ohms 1/16W
R66	YF2116222GT	Carbon	2.2K ohms 1/16W
R67	YF2116682JT	Carbon	6.8K ohms 1/16W
R68,69	YF2116102GT	Carbon	1K ohms 1/16W
R70	YF2116101JT	Carbon	100 ohms 1/16W
R71	YF2116472GT	Carbon	4.7K ohms 1/16W
R72	YF2116101JT	Carbon	100 ohms 1/16W
R74	YF2116472GT	Carbon	4.7K ohms 1/16W
R75	YF2116333GT	Carbon	33K ohms 1/16W
R76	YF2116332JT	Carbon	3.3K ohms 1/16W
R77	YF2116222GT	Carbon	2.2K ohms 1/16W
R78	YF2116101JT	Carbon	100 ohms 1/16W
R79	YF2116682JT	Carbon	6.8K ohms 1/16W
R80	YF2116223JT	Carbon	22K ohms 1/16W
R81,82	YF2116103JT	Carbon	10K ohms 1/16W
R83	YF2116222GT	Carbon	2.2K ohms 1/16W
R84	YF2116103JT	Carbon	10K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R85	YF2116105GT	Carbon	1M ohms 1/16W
R86	YF2116333GT	Carbon	33K ohms 1/16W
R87	YF2116104JT	Carbon	100K ohms 1/16W
R88	YF2116333GT	Carbon	33K ohms 1/16W
R92	YF2116101JT	Carbon	100 ohms 1/16W
R93	YF2116472GT	Carbon	4.7K ohms 1/16W
R94	YF2116473GT	Carbon	47K ohms 1/16W
R95,96	YF2116102GT	Carbon	1K ohms 1/16W
R97	YF2116472GT	Carbon	4.7K ohms 1/16W
R98,99	YWR1220P332D	Metal	3.3K ohms
R100-103	YWR1220P101D	Metal	100 ohms
R104,105	YF2116473GT	Carbon	47K ohms 1/16W
R106	YF2116472GT	Carbon	4.7K ohms 1/16W
R107,108	YF2116334JT	Carbon	330K 1/16W
R110	YWR1220P332D	Metal	3.3K ohms
R111	YWR1220P182D	Metal	1.8K ohms
R113	YWR1220P511D	Metal	510 ohms
R115	YF2116472GT	Carbon	4.7K ohms 1/16W
R116	YF2116102GT	Carbon	1K ohms 1/16W
R117	YF2116103JT	Carbon	10K ohms 1/16W
R118-121	YWR1220P102D	Metal	1K ohms
R122	YF2116222GT	Carbon	2.2K ohms 1/16W
R123	YF2116472GT	Carbon	4.7K ohms 1/16W
R124	YF2116333GT	Carbon	33K ohms 1/16W
R125	YF2116222GT	Carbon	2.2K ohms 1/16W
R126	YF2116103JT	Carbon	10K ohms 1/16W
R127	YF2116101JT	Carbon	100 ohms 1/16W
R128	YF2116682JT	Carbon	6.8K ohms 1/16W
R129	YF2116223JT	Carbon	22K ohms 1/16W
R130	YF2116472GT	Carbon	4.7K ohms 1/16W
R131	YF2116102GT	Carbon	1K ohms 1/16W
R132	YF2116152JT	Carbon	1.5K ohms 1/16W
R133,134	YF2116101JT	Carbon	100 ohms 1/16W
R135	YF2116222GT	Carbon	2.2K ohms 1/16W
R136	YF2116682JT	Carbon	6.8K ohms 1/16W
R137,138	YF2116102GT	Carbon	1K ohms 1/16W
R139	YF2116101JT	Carbon	100 ohms 1/16W
R140	YF2116272JT	Carbon	2.7K ohms 1/16W
R141	YF2116221JT	Carbon	220 ohms 1/16W
R143	YF2116272JT	Carbon	2.7K ohms 1/16W
R144	YF2116333GT	Carbon	33K ohms 1/16W
R145	YF2116332JT	Carbon	3.3K ohms 1/16W
R146	YF2116222GT	Carbon	2.2K ohms 1/16W
R147	YF2116101JT	Carbon	100 ohms 1/16W
R148	YF2116682JT	Carbon	6.8K ohms 1/16W
R149	YF2116223JT	Carbon	22K ohms 1/16W
R150,151	YF2116103JT	Carbon	10K ohms 1/16W
R152	YF2116222GT	Carbon	2.2K ohms 1/16W
R153	YF2116103JT	Carbon	10K ohms 1/16W
R154	YF2116105GT	Carbon	1M ohms 1/16W
R155	YF2116333GT	Carbon	33K ohms 1/16W
R156	YF2116104JT	Carbon	100K ohms 1/16W
R157	YF2116333GT	Carbon	33K ohms 1/16W
R161	YF2116101JT	Carbon	100 ohms 1/16W
R162	YF2116472GT	Carbon	4.7K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R163	YF2116473GT	Carbon	47K ohms 1/16W
R164,165	YF2116102GT	Carbon	1K ohms 1/16W
R166	YF2116472GT	Carbon	4.7K ohms 1/16W
R167,168	YWR1220P332D	Metal	3.3K ohms
R169-172	YWR1220P101D	Metal	100 ohms
R173,174	YF2116473GT	Carbon	47K ohms 1/16W
R175	YF2116472GT	Carbon	4.7K ohms 1/16W
R176,177	YF2116334JT	Carbon	330K 1/16W
R179	YWR1220P332D	Metal	3.3K ohms
R180	YWR1220P182D	Metal	1.8K ohms
R182	YWR1220P511D	Metal	510 ohms
R184	YF2116472GT	Carbon	4.7K ohms 1/16W
R185	YF2116102GT	Carbon	1K ohms 1/16W
R186	YF2116103JT	Carbon	10K ohms 1/16W
R187-190	YWR1220P102D	Metal	1K ohms
R191	YF2116222GT	Carbon	2.2K ohms 1/16W
R192	YF2116472GT	Carbon	4.7K ohms 1/16W
R193	YF2116333GT	Carbon	33K ohms 1/16W
R194	YF2116222GT	Carbon	2.2K ohms 1/16W
R195	YF2116103JT	Carbon	10K ohms 1/16W
R196	YF2116101JT	Carbon	100 ohms 1/16W
R197	YF2116682JT	Carbon	6.8K ohms 1/16W
R198	YF2116223JT	Carbon	22K ohms 1/16W
R199	YF2116472GT	Carbon	4.7K ohms 1/16W
R200	YF2116102GT	Carbon	1K ohms 1/16W
R201	YF2116152JT	Carbon	1.5K ohms 1/16W
R202,203	YF2116101JT	Carbon	100 ohms 1/16W
R204	YF2116222GT	Carbon	2.2K ohms 1/16W
R205	YF2116682JT	Carbon	6.8K ohms 1/16W
R206	YF2116102GT	Carbon	1K ohms 1/16W
R207-212	YF2116103JT	Carbon	10K ohms 1/16W
R213-215	YF2116223JT	Carbon	22K ohms 1/16W
R216-218	YF2116103JT	Carbon	10K ohms 1/16W
R219-221	YF2116562JT	Carbon	5.6K ohms 1/16W
R222-224	YF2116432JT	Carbon	4.3K ohms 1/16W
R225	YF2116223JT	Carbon	22K ohms 1/16W
R226	YF2116104JT	Carbon	100K ohms 1/16W
R227	YF2116223JT	Carbon	22K ohms 1/16W
R228	YF2116104JT	Carbon	100K ohms 1/16W
R229-231	YF2116103JT	Carbon	10K ohms 1/16W
R232-234	YF2116102GT	Carbon	1K ohms 1/16W
R235-237	YF2116472GT	Carbon	4.7K ohms 1/16W
R238	YF2116101JT	Carbon	100 ohms 1/16W
R239	YWR1220P683D	Metal	68K ohms
R240	YWR1220P243D	Metal	24K ohms
R250	YF2116163JT	Carbon	16K ohms 1/16W
R251	YF2116102GT	Carbon	1K ohms 1/16W
R252	YF2116163JT	Carbon	16K ohms 1/16W
R253	YF2116102GT	Carbon	1K ohms 1/16W
R254	YF2116163JT	Carbon	16K ohms 1/16W
R255	YF2116102GT	Carbon	1K ohms 1/16W
R256	YF2116474JT	Carbon	470K ohms 1/16W
R257	YF2116184JT	Carbon	180K ohms 1/16W
R258	YF2116474JT	Carbon	470K ohms 1/16W
R259	YF2116184JT	Carbon	180K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION
R260	YF2116512JT	Carbon 5.1K ohms 1/16W
R261,262	YF2116102GT	Carbon 1K ohms 1/16W
VR1	YFH0622A2R2K	Variable Resistor 2.2K ohms
VR2	YFH0621A100K	Variable Resistor 100K ohms
VR3,4	YFH0621A10K	Variable Resistor 10K ohms
VR5	YFH0622A2R2K	Variable Resistor 2.2K ohms
VR6	YFH0621A100K	Variable Resistor 100K ohms
VR7,8	YFH0621A10K	Variable Resistor 10K ohms
VR9	YFH0622A1K	Variable Resistor 1K ohms
VR10	YFH0621A100K	Variable Resistor 100K ohms
VR11,12	YFH0621A10K	Variable Resistor 10K ohms
VR13-18	YFH0622A100K	Variable Resistor 100K ohms
C1	ECEA1CKS470	Electrolytic 47 µF 16V
C2	ECEA0JS470	Electrolytic 47 µF 6.3V
C5	YF400150CHJT	Ceramic 15 pF
C6	ECSF1CE105	Tantalum 1 µF 16V
C7	YF400104FZT	Ceramic 0.1 µF
C8	ECEA1HSN010	Electrolytic 1 µF 50V
C9,10	ECEA0JKS330	Electrolytic 33 µF 6.3V
C11	YF400100CHDT	Ceramic 10 pF
C13	YF400220CHJT	Ceramic 22 pF
C14	YF400680CHJT	Ceramic 68 PF CH
C15	YF426104XKS	Ceramic 0.1 µF
C16	ECEA0JS470	Electrolytic 47 µF 6.3V
C17	YF400150CHJT	Ceramic 15 pF
C18	YF400104FZT	Ceramic 0.1 µF
C19	ECEA1CKS470	Electrolytic 47 µF 16V
C20	ECEA0JS470	Electrolytic 47 µF 6.3V
C21	ECEA1CKS470	Electrolytic 47 µF 16V
C22	ECEA0JS470	Electrolytic 47 µF 6.3V
C25	YF400150CHJT	Ceramic 15 pF
C26	ECSF1CE105	Tantalum 1 µF 16V
C27	YF400104FZT	Ceramic 0.1 µF
C28	ECEA1HSN010	Electrolytic 1 µF 50V
C29,30	ECEA0JKS330	Electrolytic 33 µF 6.3V
C31	YF400100CHDT	Ceramic 10 pF
C33	YF400220CHJT	Ceramic 22 pF
C34	YF400680CHJT	Ceramic 68 pF CH
C35	YF426104XKS	Ceramic 0.1 µF
C36	ECEA0JS470	Electrolytic 47 µF 6.3V
C37	YF400150CHJT	Ceramic 15 pF
C38	YF400104FZT	Ceramic 0.1 µF
C39	ECEA1CKS470	Electrolytic 47 µF 16V
C40	ECEA0JS470	Electrolytic 47 µF 6.3V
C41	ECEA1CKS470	Electrolytic 47 µF 16V
C42	ECEA0JS470	Electrolytic 47 µF 6.3V
C45	YF400150CHJT	Ceramic 15 pF
C46	ECSF1CE105	Tantalum 1 µF 16V
C47	YF400104FZT	Ceramic 0.1 µF
C48	ECEA1HSN010	Electrolytic 1 µF 50V
C49,50	ECEA0JKS330	Electrolytic 33 µF 6.3V
C51	YF400100CHDT	Ceramic 10 pF
C53	YF400220CHJT	Ceramic 22 pF
C54	YF400680CHJT	Ceramic 68 pF CH
C55	YF426104XKS	Ceramic 0.1 µF
C56	ECEA0JS470	Electrolytic 47 µF 6.3V
C57	YF400150CHJT	Ceramic 15 pF
C58	YF400104FZT	Ceramic 0.1 µF
C59	ECEA1CKS470	Electrolytic 47 µF 16V
C60	ECEA0JS470	Electrolytic 47 µF 6.3V
C61	ECEA1CKS470	Electrolytic 47 µF 16V
C62,63	ECEA0JKS330	Electrolytic 33 µF 6.3V
C64-67	YF400104FZT	Ceramic 0.1 µF
C68	ECEA0JKS330	Electrolytic 33 µF 6.3V
C69	ECEA0JKK100	Electrolytic 10 µF 6.3V
C70	ECEA1CKS470	Electrolytic 47 µF 16V
C80-82	ECEA0JKK100	Electrolytic 10µF 6.3V
C83,84	YF400103XKT	Ceramic 0.01 µF
C85	YF400101CHJT	Ceramic 100 pF
C86	YF400470CHJT	Ceramic 47 µF
CT1-3	YWCDX20APS	Trimmer Capacitor
L1-6	EL05SI100K	Coil 10 µH
J1,2	YF21160R00T	Jumper Resister
J21-23	YF21160R00T	Jumper Resister
J43,45	YF21160R00T	Jumper Resister
J89-91	YF21160R00T	Jumper Resister
J112,114	YF21160R00T	Jumper Resister
J158-160	YF21160R00T	Jumper Resister
J181,183	YF21160R00T	Jumper Resister
CN1,2	P/N69301-008	16 pin Connector
TP1-13	YW32BM7R5	Test pin

PROCESS-2 BOARD

PCB4 (NLA)	oYWVKCF50HP2A	Printed Circuit Board Assy
IC1	NJM4558M	IC
Q1-6	2SC2404-CDTW	Transistor
Q7	2SD601-Q	Transistor
Q8	2SC2404-CDTW	Transistor
Q9-11	2SB709-Q	Transistor
Q12,13	2SD601-Q	Transistor
Q14-16	2SC2404-CDTW	Transistor
Q17,18	2SB709-Q	Transistor
Q19-26	2SC2404-CDTW	Transistor
Q27	2SD601-Q	Transistor
Q28	2SC2404-CDTW	Transistor
Q29-31	2SB709-Q	Transistor
Q32,33	2SD601-Q	Transistor
Q34-36	2SC2404-CDTW	Transistor
Q37,38	2SB709-Q	Transistor
Q39-46	2SC2404-CDTW	Transistor
Q47	2SD601-Q	Transistor
Q48	2SC2404-CDTW	Transistor
Q49-51	2SB709-Q	Transistor
Q52,53	2SD601-Q	Transistor

REF.NO.	PART NO.	DESCRIPTION	
Q54-56	2SC2404-CDTW	Transistor	
Q57,58	2SB709-Q	Transistor	
Q59,60	2SC2404-CDTW	Transistor	
Q61	2SB709-Q	Transistor	
Q62-76	2SD601-Q	Transistor	
Q77	2SB709-Q	Transistor	
Q78	2SB793-QR	Transistor	
Q79	2SD973-QRS	Transistor	
Q80-82	2SA1022-C	Transistor	
D1-3	MA151K	Diode	
R1	YF2116101JT	Carbon	100 ohms 1/16W
R2	YF2116102GT	Carbon	1K ohms 1/16W
R3	YWR1220P272D	Metal	2.7K ohms
R4	YWR1220P152D	Metal	1.5K ohms
R5,6	YWR1220P101D	Metal	100 ohms
R9	YWR1220P152D	Metal	1.5K ohms
R10	YWR1220P272D	Metal	2.7K ohms
R11	YF2116101JT	Carbon	100 ohms 1/16W
R12	YWR1220P273D	Metal	27K ohms
R13	YWR1220P333D	Metal	33K ohms
R14	YWR1220P103D	Metal	10K ohms
R15	YF2116332JT	Carbon	3.3K ohms 1/16W
R16	YF2116333GT	Carbon	33K ohms 1/16W
R17,18	YF2116332JT	Carbon	3.3K ohms 1/16W
R19	YF2116334JT	Carbon	330K 1/16W
R20	YF2116333GT	Carbon	33K ohms 1/16W
R22	YF2116561JT	Carbon	560 ohms 1/16W
R23,24	YF2116331JT	Carbon	330 ohms 1/16W
R25	YF2116472GT	Carbon	4.7K ohms 1/16W
R26	YF2116102GT	Carbon	1K ohms 1/16W
R27	YF2116152JT	Carbon	1.5K ohms 1/16W
R28-32	YF2116472GT	Carbon	4.7K ohms 1/16W
R33	YF2116102GT	Carbon	1K ohms 1/16W
R34	YF2116333GT	Carbon	33K ohms 1/16W
R35	YF2116682JT	Carbon	6.8K ohms 1/16W
R36	YF2116101JT	Carbon	100 ohms 1/16W
R37	YF2116102GT	Carbon	1K ohms 1/16W
R38	YF2116103JT	Carbon	10K ohms 1/16W
R39	YF2116102GT	Carbon	1K ohms 1/16W
R40	YF2116101JT	Carbon	100 ohms 1/16W
R41	YF2116102GT	Carbon	1K ohms 1/16W
R44	YWR1220P272D	Metal	2.7K ohms
R45	YWR1220P152D	Metal	1.5K ohms
R46,47	YWR1220P101D	Metal	100 ohms
R48	YWR1220P152D	Metal	1.5K ohms
R49	YWR1220P272D	Metal	2.7K ohms
R50	YWR1220P273D	Metal	27K ohms
R51	YWR1220P333D	Metal	33K ohms
R52	YWR1220P103D	Metal	10K ohms
R53	YF2116101JT	Carbon	100 ohms 1/16W
R54	YF2116332JT	Carbon	3.3K ohms 1/16W
R55	YF2116333GT	Carbon	33K ohms 1/16W
R56,57	YF2116332JT	Carbon	3.3K ohms 1/16W
R58	YF2116334JT	Carbon	330K ohms 1/16W
R59	YF2116333GT	Carbon	33K ohms 1/16W
R61	YF2116102GT	Carbon	1K ohms 1/16W
R62,63	YF2116331JT	Carbon	330 ohms 1/16W
R64	YF2116472GT	Carbon	4.7K ohms 1/16W
R65	YF2116102GT	Carbon	1K ohms 1/16W
R66	YF2116152JT	Carbon	1.5K ohms 1/16W
R67-71	YF2116472GT	Carbon	4.7K ohms 1/16W
R72	YF2116102GT	Carbon	1K ohms 1/16W
R73	YF2116333GT	Carbon	33K ohms 1/16W
R74	YF2116682JT	Carbon	6.8K ohms 1/16W
R75	YF2116101JT	Carbon	100 ohms 1/16W
R76,77	YF2116102GT	Carbon	1K ohms 1/16W
R78	YF2116101JT	Carbon	100 ohms 1/16W
R79	YF2116102GT	Carbon	1K ohms 1/16W
R82	YWR1220P272D	Metal	2.7K ohms
R83	YWR1220P152D	Metal	1.5K ohms
R84,85	YWR1220P101D	Metal	100 ohms
R86	YWR1220P152D	Metal	1.5K ohms
R87	YWR1220P272D	Metal	2.7K ohms
R88	YWR1220P273D	Metal	27K ohms
R89	YWR1220P333D	Metal	33K ohms
R90	YWR1220P103D	Metal	10K ohms
R91	YF2116101JT	Carbon	100 ohms 1/16W
R92	YF2116332JT	Carbon	3.3K ohms 1/16W
R93	YF2116333GT	Carbon	33K ohms 1/16W
R94,95	YF2116332JT	Carbon	3.3K ohms 1/16W
R96	YF2116334JT	Carbon	330K 1/16W
R97	YF2116333GT	Carbon	33K ohms 1/16W
R99	YF2116102GT	Carbon	1K ohms 1/16W
R100,101	YF2116331JT	Carbon	330 ohms 1/16W
R102	YF2116472GT	Carbon	4.7K ohms 1/16W
R103	YF2116102GT	Carbon	1K ohms 1/16W
R104	YF2116152JT	Carbon	1.5K ohms 1/16W
R105-109	YF2116472GT	Carbon	4.7K ohms 1/16W
R110	YF2116102GT	Carbon	1K ohms 1/16W
R111	YF2116333GT	Carbon	33K ohms 1/16W
R112	YF2116682JT	Carbon	6.8K ohms 1/16W
R113	YF2116101JT	Carbon	100 ohms 1/16W
R114-117	YF2116102GT	Carbon	1K ohms 1/16W
R118,119	YF2116561JT	Carbon	560 ohms 1/16W
R120	YF2116221JT	Carbon	220 ohms 1/16W
R121	YF2116222GT	Carbon	2.2K ohms 1/16W
R122	YF2116103JT	Carbon	10K ohms 1/16W
R123,124	YF2116472GT	Carbon	4.7K ohms 1/16W
R125,126	YF2116102GT	Carbon	1K ohms 1/16W
R127,128	YF2116561JT	Carbon	560 ohms 1/16W
R129	YF2116221JT	Carbon	220 ohms 1/16W
R130	YF2116222GT	Carbon	2.2K ohms 1/16W
R131	YF2116103JT	Carbon	10K ohms 1/16W
R132,133	YF2116472GT	Carbon	4.7K ohms 1/16W
R134,135	YF2116102GT	Carbon	1K ohms 1/16W
R136,137	YF2116561JT	Carbon	560 ohms 1/16W
R138	YF2116221JT	Carbon	220 ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R139	YF2116222GT	Carbon	2.2K ohms 1/16W
R140	YF2116103JT	Carbon	10K ohms 1/16W
R141,142	YF2116472GT	Carbon	4.7K ohms 1/16W
R143	YF2116562JT	Carbon	5.6K ohms 1/16W
R144	YF2116272JT	Carbon	2.7K ohms 1/16W
R145	YF2116223JT	Carbon	22K ohms 1/16W
R146	YF2116473GT	Carbon	47K ohms 1/16W
R147,148	YF2116102GT	Carbon	1K ohms 1/16W
R149	YFR1220P113D	Metal	11K ohms
R150	R1220P123D	Metal	12K ohms
R151,152	YWR1220P103D	Metal	10K ohms
R153,154	YF2116102GT	Carbon	1K ohms 1/16W
R155	R1220P123D	Metal	12K ohms
R156-158	YWR1220P103D	Metal	10K ohms
R159	YF2116102GT	Carbon	1K ohms 1/16W
R161	YF2116102GT	Carbon	1K ohms 1/16W
R163	YF2116102GT	Carbon	1K ohms 1/16W
R165	YF2116332JT	Carbon	3.3K ohms 1/16W
R166	YF2116471JT	Carbon	470 ohms 1/16W
R167-171	YF2116332JT	Carbon	3.3K ohms 1/16W
R172-174	YF2116561JT	Carbon	560 ohms 1/16W
VR1	YFH0621A2R2K	Variable Resistor	2.2K ohms
VR2	YFH0622A1K	Variable Resistor	1K ohms
VR3	YFH0622A2R2K	Variable Resistor	2.2K ohms
VR4	YFH0621A2R2K	Variable Resistor	2.2K ohms
VR5	YFH0622A1K	Variable Resistor	1K ohms
VR6	YFH0622A2R2K	Variable Resistor	2.2K ohms
VR7	YFH0621A2R2K	Variable Resistor	2.2K ohms
VR8	YFH0622A1K	Variable Resistor	1K ohms
VR9	YFH0622A2R2K	Variable Resistor	2.2K ohms
VR10-15	YFH0621A10K	Variable Resistor	10K ohms
VR16-18	YFH0622A3R3K	Variable Resistor	3.3K ohms
VR19,20	EVM8AGA00B13	Variable Resistor	1K ohms
VR21-23	YFH0621A2R2K	Variable Resistor	2.2K ohms
C1	ECEA1CKS470	Electrolytic	47 µF 16V
C2	ECEA0JS470	Electrolytic	47 µF 6.3V
C5	YF426104XKS	Ceramic	0.1 µF
C6,7	ECEA0JKS330	Electrolytic	33 µF 6.3V
C8	YF400060CHDT	Ceramic	6 pF
C10	YF426104XKS	Ceramic	0.1 µF
C11	ECEA0JKS330	Electrolytic	33 µF 6.3V
C12	ECEA1HKK010	Electrolytic	1 µF 50V
C13	YF400104FZT	Ceramic	0.1 µF
C14	ECEA1CKS470	Electrolytic	47 µF 16V
C15	ECEA0JS470	Electrolytic	47 µF 6.3V
C18	YF426104XKS	Ceramic	0.1 µF
C19,20	ECEA0JKS330	Electrolytic	33 µF 6.3V
C21	YF400060CHDT	Ceramic	6 pF
C23	YF426104XKS	Ceramic	0.1 µF
C24	ECEA0JKS330	Electrolytic	33 µF 6.3V
C25	ECEA1HKK010	Electrolytic	1 µF 50V
C26	YF400104FZT	Ceramic	0.1 µF
C27	ECEA1CKS470	Electrolytic	47 µF 16V
C28	ECEA0JS470	Electrolytic	47 µF 6.3V
C31	YF426104XKS	Ceramic	0.1 µF
C32,33	ECEA0JKS330	Electrolytic	33 µF 6.3V
C34	YF400060CHDT	Ceramic	6 pF
C36	YF426104XKS	Ceramic	0.1 µF
C37	ECEA0JKS330	Electrolytic	33 µF 6.3V
C38	ECEA1HKK010	Electrolytic	1 µF 50V
C39	YF400104FZT	Ceramic	0.1 µF
C40	ECEA1CKS470	Electrolytic	47 µ F 16V
C41	ECEA1EKK2R2	Electrolytic	2.2 µF 25V
C42,43	ECEA1AKS330	Electrolytic	33 µF 10V
C44	ECEA1EKK2R2	Electrolytic	2.2 µF 25V
C45,46	ECEA1AKS330	Electrolytic	33 µF 10V
C47	ECEA1EKK2R2	Electrolytic	2.2 µF 25V
C48,49	ECEA1AKS330	Electrolytic	33 µF 10V
C50	ECEA0JKS330	Electrolytic	33 µF 6.3V
C51	ECEA1CKS470	Electrolytic	47 µF 16V
C52	YF400104FZT	Ceramic	0.1 µF
C53	ECEA0JS470	Electrolytic	47 µF 6.3V
C54	YF400104FZT	Ceramic	0.1 µF
C55,56	ECEA0JS470	Electrolytic	47 µF 6.3V
C57-59	YF400100CHDT	Ceramic	10 pF
C60-62	YW400160CHJT	Ceramic	16 pF (CH)
DL1-3	ELB4M051	Delay Line	
L1-3	EL05SI100K	Coil	10 µH
SW1	YWSSS21200	Slide Switch	
J2,3	YF21160R00T	Jamper Resister	
J6,7	YF21160R00T	Jamper Resister	
J10,11	YF21160R00T	Jamper Resister	
CN1,2	P/N69301-006	12 pin Connector	
TP1-7	YW32BM7R5	Test pin	

DETAIL BOARD

PCB5 (NLA)	o YWVKBF200E3A	Printed Circuit Board Assy
IC1	MN74HC21S	IC
IC2	MN74HC4520S	IC
IC3	MN74HC393S	IC
IC4	TC5081AP	IC
IC5	MN74HC04S	IC
IC6	MN4053BS	IC
IC7	YWCXL1004P	IC
IC8	NJM2902M	IC
IC9	MN4053BS	IC
IC10	YWCXL1004P	IC
IC11	NJM592M8	IC
IC12	MN4053BS	IC
Q4	2SD601-RS	Transistor
Q5,6	2SC2404-CDTW	Transistor

REF.NO.	PART NO.	DESCRIPTION		REF.NO.	PART NO.	DESCRIPTION	
Q7	2SB709-Q	Transistor		R39	YF2116561JT	Carbon	560 ohms 1/16W
Q8	2SD601-RS	Transistor		R40	ERSB27J512	Metal	5.1K ohms
Q9	2SC2404-CDTW	Transistor		R41	YF2116122JT	Carbon	1.2K ohms 1/16W
Q10	2SB709-Q	Transistor		R42	YF2116103JT	Carbon	10K ohms 1/16W
Q11	2SD601-RS	Transistor		R43	YF2116222GT	Carbon	2.2K ohms 1/16W
Q12	2SB709-Q	Transistor		R44	YF2116183GT	Carbon	18K ohms 1/16W
Q13-16	2SD601-RS	Transistor		R45	YF2116103JT	Carbon	10K ohms 1/16W
Q17-19	2SC2404-CDTW	Transistor		R46	YF2116562JT	Carbon	5.6K ohms 1/16W
Q20	2SA1022-C	Transistor		R47	YF2116152JT	Carbon	1.5K ohms 1/16W
Q21	2SB709-Q	Transistor		R48	YF2116472GT	Carbon	4.7K ohms 1/16W
Q22	2SB793-RS	Transistor		R49	YF2116561JT	Carbon	560 ohms 1/16W
Q23	2SD601-RS	Transistor		R50,51	YWR1220P563D	Metal	56K ohms
Q24,25	2SC2404-CDTW	Transistor		R52	YF2116113JT	Carbon	11K ohms 1/16W
Q26-29	2SD601-RS	Transistor		R53	YWR1220P103D	Metal	10K ohms
Q30-32	2SC2404-CDTW	Transistor		R54	YF2116471JT	Carbon	470 ohms 1/16W
Q33	2SA1022-C	Transistor		R55	YF2116821GT	Carbon	820 ohms 1/16W
Q34	2SB709-Q	Transistor		R58	YF2116222GT	Carbon	2.2K ohms 1/16W
Q35-42	2SD601-RS	Transistor		R59	YF2116103JT	Carbon	10K ohms 1/16W
Q43-46	2SB709-Q	Transistor		R60,61	YF2116332JT	Carbon	3.3K ohms 1/16W
Q47	2SK198-Q	Transistor		R62,63	YF2116105GT	Carbon	1M ohms 1/16W
Q48	2SD601-RS	Transistor		R64	YF2116272JT	Carbon	2.7K ohms 1/16W
Q49,50	2SK198-Q	Transistor		R65,66	YF2116102GT	Carbon	1K ohms 1/16W
Q51	2SD601-RS	Transistor		R67	YF2116103JT	Carbon	10K ohms 1/16W
Q53	2SC2404-CDTW	Transistor		R68	YF2116561JT	Carbon	560 ohms 1/16W
Q54	2SD601-RS	Transistor		R69	YF2116271JT	Carbon	270 ohms 1/16W
D1,2	MA151K	Diode		R70	YF2116561JT	Carbon	560 ohms 1/16W
D3,4	1SS97-2	Diode		R71	ERSB27J512	Metal	5.1K ohms
D5	MA151WK	Diode		R72	YF2116122JT	Carbon	1.2K ohms 1/16W
D6	MA328	Diode		R73	YF2116103JT	Carbon	10K ohms 1/16W
R3	YF2116472GT	Carbon	4.7K ohms 1/16W	R74	YF2116222GT	Carbon	2.2K ohms 1/16W
R4	YF2116473GT	Carbon	47K ohms 1/16W	R75	YF2116183GT	Carbon	18K ohms 1/16W
R6	YF2116105GT	Carbon	1M ohms 1/16W	R76	YF2116103JT	Carbon	10K ohms 1/16W
R8	YF2116102GT	Carbon	1K ohms 1/16W	R77	YF2116562JT	Carbon	5.6K ohms 1/16W
R9	YF2116105GT	Carbon	1M ohms 1/16W	R78	YF2116152JT	Carbon	1.5K ohms 1/16W
R10	YF2116103JT	Carbon	10K ohms 1/16W	R79	YF2116472GT	Carbon	4.7K ohms 1/16W
R15	YF2116222GT	Carbon	2.2K ohms 1/16W	R80	YF2116561JT	Carbon	560 ohms 1/16W
R16	YF2116103JT	Carbon	10K ohms 1/16W	R81	YF2116751JT	Carbon	750 ohms 1/16W
R17,18	YF2116332JT	Carbon	3.3K ohms 1/16W	R82	YF2116102GT	Carbon	1K ohms 1/16W
R19	YF2116472GT	Carbon	4.7K ohms 1/16W	R83	YF2116103JT	Carbon	10K ohms 1/16W
R20,21	YF2116102GT	Carbon	1K ohms 1/16W	R84	YF2116101JT	Carbon	100 ohms 1/16W
R22	YF2116332JT	Carbon	3.3K ohms 1/16W	R85-88	YF2116152JT	Carbon	1.5K ohms 1/16W
R23	YF2116223JT	Carbon	22K ohms 1/16W	R89	YF2116103JT	Carbon	10K ohms 1/16W
R24	YF2116272JT	Carbon	2.7K ohms 1/16W	R90	YF2116471JT	Carbon	470 ohms 1/16W
R25	YF2116152JT	Carbon	1.5K ohms 1/16W	R91,92	YF2116221JT	Carbon	220 ohms 1/16W
R26	YF2116333GT	Carbon	33K ohms 1/16W	R93,94	YF2116102GT	Carbon	1K ohms 1/16W
R27	YF2116103JT	Carbon	10K ohms 1/16W	R95	YF2116392JT	Carbon	3.9K ohms 1/16W
R28	YF2116472GT	Carbon	4.7K ohms 1/16W	R96	YF2116122JT	Carbon	1.2K ohms 1/16W
R29,30	YF2116105GT	Carbon	1M ohms 1/16W	R98	YF2116222GT	Carbon	2.2K ohms 1/16W
R31	YF2116303GT	Carbon	30K ohms 1/16W	R99	YF2116151JT	Carbon	150 ohms 1/16W
R32	YF2116203JT	Carbon	20K ohms 1/16W	R100	YF2116222GT	Carbon	2.2K ohms 1/16W
R33	YF2116272JT	Carbon	2.7K ohms 1/16W	R101	YF2116821GT	Carbon	820 ohms 1/16W
R34,35	YF2116102GT	Carbon	1K ohms 1/16W	R102,103	YF2116102GT	Carbon	1K ohms 1/16W
R36	YF2116103JT	Carbon	10K ohms 1/16W	R104,105	YF2116222GT	Carbon	2.2K ohms 1/16W
R37	YF2116561JT	Carbon	560 ohms 1/16W	R106	YF2116223JT	Carbon	22K ohms 1/16W
R38	YF2116271JT	Carbon	270 ohms 1/16W	R107	YF2116333GT	Carbon	33K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION
R108	YF2116153JT	Carbon 15K ohms 1/16W
R109	YF2116682JT	Carbon 6.8K ohms 1/16W
R110	YF2116102GT	Carbon 1K ohms 1/16W
R111	YF2116104JT	Carbon 100K ohms 1/16W
R112	YF2116154JT	Carbon 150K ohms 1/16W
R113	YF2116333GT	Carbon 33K ohms 1/16W
R114	YF2116223JT	Carbon 22K ohms 1/16W
R115	YF2116331JT	Carbon 330 ohms 1/16W
R116	YF2116222GT	Carbon 2.2K ohms 1/16W
R117	YF2116331JT	Carbon 330 ohms 1/16W
R118	YF2116101JT	Carbon 100 ohms 1/16W
R119	YF2116332JT	Carbon 3.3K ohms 1/16W
R120	YF2116102GT	Carbon 1K ohms 1/16W
R121	YF2116152JT	Carbon 1.5K ohms 1/16W
R122	YF2116562JT	Carbon 5.6K ohms 1/16W
R123	YF2116152JT	Carbon 1.5K ohms 1/16W
R124	YF2116562JT	Carbon 5.6K ohms 1/16W
R125	YF2116681JT	Carbon 680 ohms 1/16W
R126	YF2116101JT	Carbon 100 ohms 1/16W
R127	YF2116222GT	Carbon 2.2K ohms 1/16W
R128	YF2116103JT	Carbon 10K ohms 1/16W
R129,130	YF2116331JT	Carbon 330 ohms 1/16W
R131-135	YF2116103JT	Carbon 10K ohms 1/16W
R136-138	YF2116682JT	Carbon 6.8K ohms 1/16W
R139	YF2116332JT	Carbon 3.3K ohms 1/16W
R140	YF2116103JT	Carbon 10K ohms 1/16W
R141	R1220P123D	Metal 12K ohms
R142,143	YF2116104JT	Carbon 100K ohms 1/16W
R144,145	YF2116102GT	Carbon 1K ohms 1/16W
R146	YF2116182GT	Carbon 1.8K ohms 1/16W
R147	YF2116104JT	Carbon 100K ohms 1/16W
R148	YF2116272JT	Carbon 2.7K ohms 1/16W
R149	YF2116511JT	Carbon 510 ohms 1/16W
R150	YF2116272JT	Carbon 2.7K ohms 1/16W
R151	YF2116511JT	Carbon 510 ohms 1/16W
R152,153	YF2116152JT	Carbon 1.5K ohms 1/16W
R163	YF2116103JT	Carbon 10K ohms 1/16W
R164	YF2116222GT	Carbon 2.2K ohms 1/16W
R165	YF2116152JT	Carbon 1.5K ohms 1/16W
R166	YF2116222GT	Carbon 2.2K ohms 1/16W
R167	YF2116302GT	Carbon 3K ohms 1/16W
R168	YF2116103JT	Carbon 10K ohms 1/16W
R170	YF2116474JT	Carbon 470K ohms 1/16W
R171	YF2116184JT	Carbon 180K ohms 1/16W
R172,173	YF2116222GT	Carbon 2.2K ohms 1/16W
VR3	YWH0621A4R7K	Variable Resistor 4.7K ohms
VR4	YFH0621A22KB	Variable Resistor 22K ohms
VR5,6	YFH0621A2R2K	Variable Resistor 2.2K ohms
VR7,8	YFH0621A1R5K	Variable Resistor 1.5K ohms
VR9,10	YWH0621A4R7K	Variable Resistor 4.7K ohms
VR11,12	YFH0621A2R2K	Variable Resistor 2.2K ohms
VR13,14	YFH0621A1R5K	Variable Resistor 1.5K ohms
VR15	YWH0621A4R7K	Variable Resistor 4.7K ohms
VR18	YFH0621A1R5K	Variable Resistor 1.5K ohms
VR19	YFH0621A2R2K	Variable Resistor 2.2K ohms
VR20	YFH0621A470	Variable Resistor 470 ohms
VR21	EVM8AGA00B13	Variable Resistor 1K ohms
VR22	YFH0621A2R2K	Variable Resistor 2.2K ohms
VR23	PK502H502V2A	Variable Resistor 5K ohms
VR24	YFH0621A100K	Variable Resistor 100Kohms
VR25,26	YWH0621A4R7K	Variable Resistor 4.7K ohms
VR27	PK502H202V2A	Variable Resistor 2K ohms
VR28	PK502H102V2A	Variable Resistor 1K ohms
C2,3	ECSF1AE106	Tantalum 10 µF 10V
C4	ECQM1H104JZ	Plastic 0.1 µF 50V
C5	YF400470CHJT	Ceramic 47 pF
C6	YF400331CHJT	Ceramic 330 pF
C7,8	YF400100CHDT	Ceramic 10 pF
C9	YF400221CHJT	Ceramic 220 pF
C15	ECEA1CKS470	Electrolytic 47 µF 16V
C16	ECEA0JKS330	Electrolytic 33 µF 6.3V
C17	YF426104XKS	Ceramic 0.1 µF
C18	ECEA0JKS330	Electrolytic 33 µF 6.3V
C19	ECEA1AS470	Electrolytic 47 µF 10V
C20,21	ECEA1HSN010	Electrolytic 1 µF 50V
C22	ECEA1CKS100	Electrolytic 10 µF 16V
C23,24	ECEA1EK3R3	Electrolytic 3.3 µF 25V
C25	ECEA1CKS100	Electrolytic 10 µF 16V
C26	YF400104FZT	Ceramic 0.1 µF
C27	ECEA1CKS100	Electrolytic 10 µF 16V
C28,29	ECEA1EK3R3	Electrolytic 3.3 µF 25V
C30,31	ECEA1CKS100	Electrolytic 10 µF 16V
C32	ECEA0JKS330	Electrolytic 33 µF 6.3V
C33	ECEA1AKS330	Electrolytic 33 µF 10V
C34	YF426104XKS	Ceramic 0.1 µF
C35	ECEA1AKS330	Electrolytic 33 µF 10V
C36	ECEA0JK220	Electrolytic 22 µF 6.3V
C38	ECEA1CKS100	Electrolytic 10 µF 16V
C39	ECEA0JKS330	Electrolytic 33 µF 6.3V
C40,41	ECEA1HSN010	Electrolytic 1 µF 50V
C42	ECEA1CKS100	Electrolytic 10 µF 16V
C43,44	ECEA1EK3R3	Electrolytic 3.3 µF 25V
C45,46	ECEA1CKS100	Electrolytic 10 µF 16V
C47,48	ECEA1EK3R3	Electrolytic 3.3 µF 25V
C49,50	ECEA1CKS100	Electrolytic 10 µF 16V
C51	ECEA0JKS330	Electrolytic 33 µF 6.3V
C52	ECEA1AKS330	Electrolytic 33 µF 10V
C53	YF426104XKS	Ceramic 0.1 µF
C55	ECEA1AKS330	Electrolytic 33 µF 10V
C58	ECEA1CKS100	Electrolytic 10 µF 16V
C59	YF400103XKT	Ceramic 0.01 µF
C60	ECEA1CSN100	Electrolytic 10 µF 16V
C61	YF400220CHJT	Ceramic 22 pF
C62	YF400151CHJT	Ceramic 150 pF
C63	ECEA1ASS101	Electrolytic 100 µF 10V
C65	YF400103XKT	Ceramic 0.01 µF
C66	YF400470CHJT	Ceramic 47 pF
C67	YF400103XKT	Ceramic 0.01 µF

REF.NO.	PART NO.	DESCRIPTION	
C68	YF400470CHJT	Ceramic	47 pF
C69	YF400102XKT	Ceramic	1000 pF
C70	ECEA1CKS100	Electrolytic	10 µF 16V
C71	YF400103XKT	Ceramic	0.01 µF
C72	ECEA1CSN100	Electrolytic	10 µF 16V
C75	YF400560CHJT	Ceramic	56 pF
C76	YF400050CHDT	Ceramic	5 pF
C77,78	ECEA1AS470	Electrolytic	47 µF 10V
C79	ECEA1ASS101	Electrolytic	100 µF 10V
C80	ECEA1CKS470	Electrolytic	47µF 16V
C81	ECEA1ASS101	Electrolytic	100 µF 10V
C82	ECEA1CKS470	Electrolytic	47 µF 16V
C83	ECEA1AS470	Electrolytic	47 µF 10V
C84	YF400103XKT	Ceramic	0.01 µF
C85	ECEA1AS470	Electrolytic	47 µF 10V
C86	YF400103XKT	Ceramic	0.01 µF
C87-96	YF400104FZT	Ceramic	0.1 µF
C97	YF400103XKT	Ceramic	0.01 µF
C98	ECEA1CKS330	Electrolytic	33 µF 16V
C99	YF400150CHJT	Ceramic	15 pF
C100	ECEA1CKS100	Electrolytic	10 µF 16V
CT1	YWCDX20APS	Trimmer Capacitor	
L1	YWL5330J	Coil	33 µH
L2	ELEPE4R7KA	Coil	4.7 µH
L4-9	YWL5330J	Coil	33 µH
L10	EL05SI101K	Coil	100 µH
L11,12	EL05SI330K	Coil	33 µH
SW1	YWSSS322	Slide Switch	
SW2	SSS312	Slide Switch	
CF1	ELB4K055	Filter	
CF2	ELB4K054	Filter	
CF3	ELB4L061	Filter	
J5	YF21160R00T	Jumper Resistor	
CN1,2	P/N69301-006	12 pin Connector	
TP1-16	YW32BM7R5	Test pin	

ENCODER BOARD

REF.NO.	PART NO.	DESCRIPTION	
PCB6 (NLA)	o YWVKCF200E3A	Printed Circuit Board Assy	
IC1	MN50005LVD	IC	
IC2	MN4053BS	IC	
IC3	TC4053BF	IC	
IC4	AN614	IC	
IC5	TC4053BF	IC	
IC6	AN614	IC	
IC7	NJM2904M	IC	
IC8	MN4053BS	IC	
IC9	MN4001BS	IC	
IC10	NJM319M	IC	
Q1-3	2SD601-RS	Transistor	
Q4,5	2SC2404-CDTW	Transistor	
Q6,7	2SD601-RS	Transistor	
Q8	2SC2404-CDTW	Transistor	

REF.NO.	PART NO.	DESCRIPTION	
Q9	2SD601-RS	Transistor	
Q10	2SC2404-CDTW	Transistor	
Q11-14	2SD601-RS	Transistor	
Q15	2SC2404-CDTW	Transistor	
Q16	2SD601-RS	Transistor	
Q19,20	2SC2404-CDTW	Transistor	
Q21	2SD601-RS	Transistor	
Q22	2SB709-Q	Transistor	
Q23-29	2SD601-RS	Transistor	
Q30,31	2SB709-Q	Transistor	
Q32-37	2SD601-RS	Transistor	
Q39-43	2SD601-RS	Transistor	
Q44	2SB710-Q	Transistor	
Q45	2SB793A-RS	Transistor	
Q46	2SD601-RS	Transistor	
Q48	2SB709-Q	Transistor	
Q49,50	2SD601-RS	Transistor	
Q51	2SB709-Q	Transistor	
Q52	2SD601-RS	Transistor	
Q53	2SB709-Q	Transistor	
Q54	2SD601-RS	Transistor	
Q55	2SB709-Q	Transistor	
Q56	2SD601-RS	Transistor	
D1	MA151WK	Diode	
D2	MA4043M	Diode	
D3	MA157TW	Diode	
D5,6	MA151K	Diode	
D7	MA4043M	Diode	
D8	MA157TW	Diode	
R1	YF2116272JT	Carbon	2.7K ohms 1/16W
R2	YF2116332JT	Carbon	3.3K ohms 1/16W
R3	YF2116103JT	Carbon	10K ohms 1/16W
R5	YF2116223JT	Carbon	22K ohms 1/16W
R6	YF2116102GT	Carbon	1K ohms 1/16W
R8	YF2116391JT	Carbon	390 ohms 1/16W
R9	YWR1220P562D	Metal	5.6K ohms
R10	YWR1220P682D	Metal	6.8K ohms
R11	YWR1220P562D	Metal	5.6K ohms
R12	YWR1220P682D	Metal	6.8K ohms
R13	YWR1220P562D	Metal	5.6K ohms
R14	YWR1220P682D	Metal	6.8K ohms
R15	YWR1220P333D	Metal	33K ohms
R16-18	YF2116152JT	Carbon	1.5K ohms 1/16W
R19	YF2116563JT	Carbon	56K ohms 1/16W
R20-22	YF2116102GT	Carbon	1K ohms 1/16W
R23	YWR1220P182D	Metal	1.8K ohms
R24	YWR1220P241D	Metal	240 ohms
R25	YWR1220P332D	Metal	3.3K ohms
R26	YWR1220P912D	Metal	9.2K ohms
R27	YWR1220P561D	Metal	560 ohms
R28	YWR1220P682D	Metal	6.8K ohms
R29	YWR1220P152D	Metal	1.5K ohms
R34	YF2116182GT	Carbon	1.8K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R35	YF2116122JT	Carbon	1.2K ohms 1/16W
R36	YF2116101JT	Carbon	100 ohms 1/16W
R37	YF2116472GT	Carbon	4.7K ohms 1/16W
R38	YF2116432JT	Carbon	4.3K ohms 1/16W
R39,40	YF2116511JT	Carbon	510 ohms 1/16W
R41	YF2116272JT	Carbon	2.7K ohms 1/16W
R42	YF2116103JT	Carbon	10K ohms 1/16W
R43	YF2116222GT	Carbon	2.2K ohms 1/16W
R44	YF2116101JT	Carbon	100 ohms 1/16W
R45	YF2116223JT	Carbon	22K ohms 1/16W
R47,48	YF2116562JT	Carbon	5.6K ohms 1/16W
R49	YF2116472GT	Carbon	4.7K ohms 1/16W
R50	YF2116102GT	Carbon	1K ohms 1/16W
R51	YF2116362JT	Carbon	3.6K ohms 1/16W
R52	YF2116222GT	Carbon	2.2K ohms 1/16W
R53	YF2116472GT	Carbon	4.7K ohms 1/16W
R54	YF2116512JT	Carbon	5.1K ohms 1/16W
R55	YF2116362JT	Carbon	3.6K ohms 1/16W
R56	YF2116102GT	Carbon	1K ohms 1/16W
R57	YF2116562JT	Carbon	5.6K ohms 1/16W
R58-60	YF2116102GT	Carbon	1K ohms 1/16W
R61	YF2116182GT	Carbon	1.8K ohms 1/16W
R62	YF2116302GT	Carbon	3K ohms 1/16W
R63	YF2116162JT	Carbon	1.6K ohms 1/16W
R64	YF2116221JT	Carbon	220 ohms 1/16W
R65	YF2116272JT	Carbon	2.7K ohms 1/16W
R66	YF2116681JT	Carbon	680 ohms 1/16W
R68	YF2116103JT	Carbon	10K ohms 1/16W
R69	YF2116391JT	Carbon	390 ohms 1/16W
R70	YF2116302GT	Carbon	3K ohms 1/16W
R71	YF2116682JT	Carbon	6.8K ohms 1/16W
R72	YF2116133GT	Carbon	13K ohms 1/16W
R73	YF2116392JT	Carbon	3.9K ohms 1/16W
R74	YF2116221JT	Carbon	220 ohms 1/16W
R75	YF2116223JT	Carbon	22K ohms 1/16W
R76,77	YF2116100JT	Carbon	10 ohms 1/16W
R80	YF2116103JT	Carbon	10K ohms 1/16W
R81,82	YF2116560JT	Carbon	56 ohms 1/16W
R85	YF2116332JT	Carbon	3.3K ohms 1/16W
R86	YF2116222GT	Carbon	2.2K ohms 1/16W
R87	YWR1220P102D	Metal	1K ohms
R89	YWR1220P562D	Metal	5.6K ohms
R92	YF2116122JT	Carbon	1.2K ohms 1/16W
R93-95	YF2116222GT	Carbon	2.2K ohms 1/16W
R96,97	YF2116511JT	Carbon	510 ohms 1/16W
R99	YF2116102GT	Carbon	1K ohms 1/16W
R100	YF2116101JT	Carbon	100 ohms 1/16W
R101	YF2116562JT	Carbon	5.6K ohms 1/16W
R102	YF2116223JT	Carbon	22K ohms 1/16W
R103	YF2116221JT	Carbon	220 ohms 1/16W
R104	YF2116103JT	Carbon	10K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R105	YF2116563JT	Carbon	56K ohms 1/16W
R106	YF2116222GT	Carbon	2.2K ohms 1/16W
R107	YF2116362JT	Carbon	3.6K ohms 1/16W
R108,109	YF2116241JT	Carbon	240 ohms 1/16W
R110	YF2116562JT	Carbon	5.6K ohms 1/16W
R111	YF2116222GT	Carbon	2.2K ohms 1/16W
R112	YF2116272JT	Carbon	2.7K ohms 1/16W
R113	YF2116562JT	Carbon	5.6K ohms 1/16W
R114	YF2116103JT	Carbon	10K ohms 1/16W
R115	YF2116332JT	Carbon	3.3K ohms 1/16W
R116,117	YF2116471JT	Carbon	470 ohms 1/16W
R118	YF2116103JT	Carbon	10K ohms 1/16W
R119	YF2116682JT	Carbon	6.8K ohms 1/16W
R120	YF2116122JT	Carbon	1.2K ohms 1/16W
R121	YF2116152JT	Carbon	1.5K ohms 1/16W
R122	YF2116153JT	Carbon	15K ohms 1/16W
R123	YF2116222GT	Carbon	2.2K ohms 1/16W
R124	YF2116122JT	Carbon	1.2K ohms 1/16W
R125	YF2116272JT	Carbon	2.7K ohms 1/16W
R126	YF2116103JT	Carbon	10K ohms 1/16W
R127	YF2116223JT	Carbon	22K ohms 1/16W
R128	YF2116562JT	Carbon	5.6K ohms 1/16W
R129	YF2116103JT	Carbon	10K ohms 1/16W
R130	YF2116512JT	Carbon	5.1K ohms 1/16W
R131	YF2116472GT	Carbon	4.7K ohms 1/16W
R132	YF2116223JT	Carbon	22K ohms 1/16W
R133	YF2116561JT	Carbon	560 ohms 1/16W
R134-136	YF2116332JT	Carbon	3.3K ohms 1/16W
R137	YF2116222GT	Carbon	2.2K ohms 1/16W
R138	YWR1220P152D	Metal	1.5K ohms
R139	R1220P820D	Metal	82 ohms
R140	YWR1220P332D	Metal	3.3K ohms
R143	YF2116122JT	Carbon	1.2K ohms 1/16W
R144-146	YF2116222GT	Carbon	2.2K ohms 1/16W
R147	YF2116151JT	Carbon	150 ohms 1/16W
R148	YF2116152JT	Carbon	1.5K ohms 1/16W
R150	YF2116332JT	Carbon	3.3K ohms 1/16W
R151	YF2116102GT	Carbon	1K ohms 1/16W
R152	YF2116821GT	Carbon	820 ohms 1/16W
R153	YF2116101JT	Carbon	100 ohms 1/16W
R154	YF2116332JT	Carbon	3.3K ohms 1/16W
R155	YF2116223JT	Carbon	22K ohms 1/16W
R156	YF2116221JT	Carbon	220 ohms 1/16W
R157	YF2116111GT	Carbon	110 ohms 1/16W
R158	YF2116103JT	Carbon	10K ohms 1/16W
R159	YF2116222GT	Carbon	2.2K ohms 1/16W
R160	YF2116563JT	Carbon	56K ohms 1/16W
161	YF2116222GT	Carbon	2.2K ohms 1/16W
R162	YF2116152JT	Carbon	1.5K ohms 1/16W
R163	YF2116101JT	Carbon	100 ohms 1/16W
R164	YWR1220P393D	Metal	39K ohms
R165	YWR1220P683D	Metal	68K ohms
R166	YF2116471JT	Carbon	470 ohms 1/16W
R167	YF2116152JT	Carbon	1.5K ohms 1/16W
R168	YFR1220P113D	Metal	11K ohms

REF.NO.	PART NO.	DESCRIPTION
R169	R1220P123D	Metal 12K ohms
R170,171	YWR1220P103D	Metal 10K ohms
R172	YF2116103JT	Carbon 10K ohms 1/16W
R173	YF2116183GT	Carbon 18K ohms 1/16W
R174,176	YF2116102GT	Carbon 1K ohms 1/16W
R177	YF2116101JT	Carbon 100 ohms 1/16W
R180	YF2116332JT	Carbon 3.3K ohms 1/16W
R181	YF2116202JT	Carbon 2K ohms 1/16W
R182	YF2116152JT	Carbon 1.5K ohms 1/16W
R183	YF2116272JT	Carbon 2.7K ohms 1/16W
R184	YF2116104JT	Carbon 100K ohms 1/16W
R185,186	YF2116333GT	Carbon 33K ohms 1/16W
R187	YF2116682JT	Carbon 6.8K ohms 1/16W
R188	YF2116103JT	Carbon 10K ohms 1/16W
R189	YF2116472GT	Carbon 4.7K ohms 1/16W
R190	YF2116102GT	Carbon 1K ohms 1/16W
R191	YF2116221JT	Carbon 220 ohms 1/16W
R192	YF2116392JT	Carbon 3.9K ohms 1/16W
R193	YF2116103JT	Carbon 10K ohms 1/16W
R194	YF2116272JT	Carbon 2.7K ohms 1/16W
R195	YF2116102GT	Carbon 1K ohms 1/16W
R196	YF2116562JT	Carbon 5.6K ohms 1/16W
R197	YF2116222GT	Carbon 2.2K ohms 1/16W
R198	YF2116221JT	Carbon 220 ohms 1/16W
R199	YF2116222GT	Carbon 2.2K ohms 1/16W
R202	YF2116104JT	Carbon 100K ohms 1/16W
R203	YF2116102GT	Carbon 1K ohms 1/16W
R205	YF2116223JT	Carbon 22K ohms 1/16W
R206	YF2116103JT	Carbon 10K ohms 1/16W
R207	YF2116272JT	Carbon 2.7K ohms 1/16W
R208	YF2116472GT	Carbon 4.7K ohms 1/16W
R209	YF2116913JT	Carbon 91K ohms 1/16W
R210	YF2116103JT	Carbon 10K ohms 1/16W
R211	YF2116622JT	Carbon 6.2K ohms 1/16W
R212	YF2116103JT	Carbon 10K ohms 1/16W
R214	YF2116220JT	Carbon 22 ohms 1/16W
R215,216	YF2116560JT	Carbon 56 ohms 1/16W
R217	YF2116562JT	Carbon 5.6K ohms 1/16W
R218,220	YF2116103JT	Carbon 10K ohms 1/16W
R221	YF2116223JT	Carbon 22K ohms 1/16W
R222	YF2116104JT	Carbon 100K ohms 1/16W
R223	YF2116103JT	Carbon 10K ohms 1/16W
R224	YF2116222GT	Carbon 2.2K ohms 1/16W
R225	YF2116272JT	Carbon 2.7K ohms 1/16W
R226	YF2116473GT	Carbon 47K ohms 1/16W
R227	YF2116102GT	Carbon 1K ohms 1/16W
R228	YF2116181JT	Carbon 180 ohms 1/16W
VR1	YFH0621A10K	Variable Resistor 10K ohms
VR2	EVM8AGA00B13	Variable Resistor 1K ohms
VR3	YFH0622A1K	Variable Resistor 1K ohms
VR4	YFH0622A2R2K	Variable Resistor 2.2K ohms
VR5,6	YFH0622A470	Variable Resistor 470 ohms
VR7	YFH0622A2R2K	Variable Resistor 2.2K ohms
VR8	YFH0622A470	Variable Resistor 470 ohms
VR9,10	YWH0621A47K	Variable Resistor 47K ohms

REF.NO.	PART NO.	DESCRIPTION
VR11,12	YFH0622A2R2K	Variable Resistor 2.2K ohms
VR13,14	YFH0621A2R2K	Variable Resistor 2.2K ohms
VR15	YFH0622A1K	Variable Resistor 1K ohms
VR16	YFH0622A470	Variable Resistor 470 ohms
VR17	YFH0622A2R2K	Variable Resistor 2.2K ohms
VR18	YFH0622A1K	Variable Resistor 1K ohms
C1	YF400101CHJT	Ceramic 100 pF
C2	YF400270CHJT	Ceramic 27 pF
C4-6	ECEA0JKS101	Electrolytic 100 µF 6.3V
C7	YF400681CHJT	Ceramic 680 µF 50V
C8	ECEA1CKS470	Electrolytic 47 µF 16V
C9	YF400103XKT	Ceramic 0.01 µF
C10	YF400330CHJT	Ceramic 33 pF
C11	ECEA0JS470	Electrolytic 47 µF 6.3V
C12	ECQV05224JC	Plastic 0.22 µF 50V
C13	ECSF1AE476	Tantalum 47 µF 10V
C14,15	ECEA1CKS470	Electrolytic 47 µF 16V
C16	YF400100CHDT	Ceramic 10 pF
C17	ECEA1ASN100	Electrolytic 10 µF 10V
C18	ECEA1CKS470	Electrolytic 47 µF 16V
C20	ECEA0JS470	Electrolytic 47 µF 6.3V
C22	ECEA1CKK4R7	Electrolytic 4.7µF 16V
C23	ECEA1CKS100	Electrolytic 10 µF 16V
C24,25	ECEA0GU102	Electrolytic 1000 µF 4V
C26	ECEA1HKK010	Electrolytic 1 µF 50V
C28	YF400470CHJT	Ceramic 47 pF
C29	YF400221CHJT	Ceramic 220 pF
C31	ECEA1CKS470	Electrolytic 47 µF 16V
C32	ECQV05224JC	Plastic 0.22 µF 50V
C33	YF400103XKT	Ceramic 0.01 µF
C34	ECSF1AE476	Tantalum 47 µF 10V
C35	YF400103XKT	Ceramic 0.01µ F
C36	ECSF1AE476	Tantalum 47 µF 10V
C37	YF400050CHDT	Ceramic 5 pF
C38	ECSF1VE105	Tantalum 1 µF 10V
C39	ECSF1AE476	Tantalum 47 µF 10V
C40	ECEA1CKS470	Electrolytic 47 µF 16V
C41	YF400103XKT	Ceramic 0.01 µF
C42	YF400270CHJT	Ceramic 27 pF
C43	YF400221CHJT	Ceramic 220 pF
C44	YF400330CHJT	Ceramic 33 pF
C46	YF400180CHJT	Ceramic 18 pF
C47	YF400680CHJT	Ceramic 68 pF CH
C48	YF400221CHJT	Ceramic 220 pF
C49	ECEA1ASN100	Electrolytic 10 µF 10V
C51	ECEA1CKS470	Electrolytic 47µF 16V
C52	YF400103XKT	Ceramic 0.01 µF
C53	YF400100CHDT	Ceramic 10 pF
C54	ECEA1CKS470	Electrolytic 47 µF 16V
C55	ECEA1ASN330	Electrolytic 33 µF 10V
C57	YF400470CHJT	Ceramic 47 pF
C58	YF400221CHJT	Ceramic 220 pF
C60	ECQV05224JC	Plastic 0.22 F 50V
C61	ECSF1AE476	Tantalum 47 µF 10V
C62	YF400103XKT	Ceramic 0.01 µF

REF.NO.	PART NO.	DESCRIPTION	
C63	YF400050CHDT	Ceramic	5 pF
C64	ECSF1AE476	Tantalum	47 µF 10V
C65	YF400103XKT	Ceramic	0.01 µF
C66	ECEA0JK221	Electrolytic	220 µF 6.3V
C67,68	ECEA0JK220	Electrolytic	22 µF 6.3V
C69	ECEA1CKS470	Electrolytic	47 µF 16V
C70	YF400102XKT	Ceramic	1000 pF
C71	YF400270CHJT	Ceramic	27 pF
C72	YF400150CHJT	Ceramic	15 pF
C73	YF400103XKT	Ceramic	0.01 µF
C75	YF400680CHJT	Ceramic	68 pF CH
C76,77	YF400102XKT	Ceramic	1000 pF
C78	ECEA1CKS470	Electrolytic	47 µF 16V
C79	YF400103XKT	Ceramic	0.01 µF
C80,82	YF400151CHJT	Ceramic	150 pF
C83	YF400330CHJT	Ceramic	33 pF
C85	ECEA1CKS470	Electrolytic	47 µF 16V
C86,87	YF400103XKT	Ceramic	0.01 µF
C88	ECEA1ASN100	Electrolytic	10 µF 10V
C90	YF400470CHJT	Ceramic	47 pF
C91	ECQM1H104JZ	Plastic	0.1 µF 50V
C92	ECEA0JS470	Electrolytic	47 µF 6.3V
C93	ECEA0JKA331	Electrolytic	330 µF 6.3V
C94	YF400154XKT	Ceramic	0.15 µF
C95	YF400470CHJT	Ceramic	47 pF
CT1,2	YWCDX20APS	Trimmer Capacitor	
DL1	ELB4M049	Delay Line	
DL2	ELB4L058	Delay Line	
L1	EL05SI221K	Coil	220 µH
L2,3	EL05SI470K	Coil	47 µH
L4	EL05SI220K	Coil	22 µH
L5	EL05SI100K	Coil	10 µH
L6	YFEL05SI4R7K	Coil	4.7 µH
SW1,2	YWSSS21200	Slide Switch	
J4,78	YF21160R00T	JumperResistor	
J79,88	YF21160R00T	Jumper Resistor	
J175,213	YF21160R00T	Jumper Resistor	
J502,503	YF21160R00T	Jumper Resistor	
J505,508	YF21160R00T	Jumper Resistor	
J509	YF21160R00T	Jumper Resistor	
CN1	P/N69301-008	16 pin Connector	
CN1	P/N69301-009	18 pin Connector	
TP1-10	YW32BM7R5	Test pin	

SYNC BOARD

REF.NO.	PART NO.	DESCRIPTION	
PCB7 (NLA)	o YWVKBF200E4A	Printed Circuiy Board Assy	
IC1	MN74HC04S	IC	
IC2,3	MN74HC221S	IC	
IC4	HD14557BP	IC	
IC5	MN74HC221S	IC	
IC6	MN74HC00S	IC	
IC7	MN4053BS	IC	
IC8	MN74HC221S	IC	
IC9	SN74LS221S	IC	
IC10	MN74HC153S	IC	
IC11,12	MN74HC74S	IC	
IC13	MN74HC86S	IC	
IC14	MN74HC4053S	IC	
IC15	MN74HC08S	IC	
IC18	YWCX7930A	IC	
IC19	TC5081AP	IC	
IC20	NJM2904M	IC	
IC21,22	MN4001BS	IC	
IC23	MN4071BS	IC	
IC24	MN4001BS	IC	
IC25	MN4049BS	IC	
IC26	MN74HC74S	IC	
IC27	MN74HC221S	IC	
IC28	MN4049BS	IC	
IC29	MN4050BS	IC	
IC30	MN74HC00S	IC	
IC31	NJM2904M	IC	
IC32	MN74HC00S	IC	
Q1-3	2SD601-RS	Transistor	
Q4	2SA1022-C	Transistor	
Q5,6	2SC2404-CDTW	Transistor	
Q7,8	2SD601-RS	Transistor	
Q9-14	2SC2404-CDTW	Transistor	
Q15	2SB793-RS	Transistor	
Q18,19	2SC2404-CDTW	Transistor	
D2-4	YWFC54M	Diode	
R1	YF2116101JT	Carbon	100 ohms 1/16W
R2	YF2116104JT	Carbon	100K ohms 1/16W
R3	YF2116105GT	Carbon	1M ohms 1/16W
R4	YF2116101JT	Carbon	100 ohms 1/16W
R5	YF2116331JT	Carbon	330 ohms 1/16W
R8,9	YF2116102GT	Carbon	1K ohms 1/16W
R10	YF2116333GT	Carbon	33K ohms 1/16W
R11,12	YF2116104JT	Carbon	100K ohms 1/16W
R13	YF2116333GT	Carbon	33K ohms 1/16W
R14	YF2116103JT	Carbon	10K ohms 1/16W
R15	YF2116223JT	Carbon	22K ohms 1/16W
R16	YF2116103JT	Carbon	10K ohms 1/16W
R17	YF2116102GT	Carbon	1K ohms 1/16W
R18	YF2116471JT	Carbon	470 ohms 1/16W
R19	YF2116101JT	Carbon	100 ohms 1/16W
R20,21	YF2116471JT	Carbon	470 ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R22	YF2116105GT	Carbon	1M ohms 1/16W
R33	YF2116104JT	Carbon	100K ohms 1/16W
R34	YF2116223JT	Carbon	22K ohms 1/16W
R35	YF2116203GT	Carbon	20K ohms 1/16W
R36	YF2116153JT	Carbon	15K ohms 1/16W
R40	YF2116303GT	Carbon	30K ohms 1/16W
R41	YF2116473GT	Carbon	47K ohms 1/16W
R43	YF2116102GT	Carbon	1K ohms 1/16W
R44	YF2116105GT	Carbon	1M ohms 1/16W
R45	YF2116103JT	Carbon	10K ohms 1/16W
R46	YF2116222GT	Carbon	2.2K ohms 1/16W
R47	YF2116562JT	Carbon	5.6K ohms 1/16W
R50	YF2116472GT	Carbon	4.7K ohms 1/16W
R51	YF2116123JT	Carbon	12K ohms 1/16W
R52	YF2116432JT	Carbon	4.3K ohms 1/16W
R53	YF2116222GT	Carbon	2.2K ohms 1/16W
R54	YF2116223JT	Carbon	22K ohms 1/16W
R97	YF2116821GT	Carbon	820 ohms 1/16W
R98,99	YWR1220P103D	Metal	10K ohms
R100	YFR1220P113D	Metal	11K ohms
R101	R1220P123D	Metal	12K ohms
R102,103	YF2116123JT	Carbon	12K ohms 1/16W
R104,105	YF2116223JT	Carbon	22K ohms 1/16W
R106	YF2116683GT	Carbon	68K ohms 1/16W
R107	YF2116823JT	Carbon	82K ohms 1/16W
R108	YF2116224JT	Carbon	220K ohms 1/16W
R109	YF2116333GT	Carbon	33K ohms 1/16W
R110	YF2116224JT	Carbon	220K ohms 1/16W
R111	YF2116333GT	Carbon	33K ohms 1/16W
R113	YF2116101JT	Carbon	100 ohms 1/16W
R114	YF2116102GT	Carbon	1K ohms 1/16W
R115	YF2116563JT	Carbon	56K ohms 1/16W
R116,117	YF2116102GT	Carbon	1K ohms 1/16W
R118	YF2116471JT	Carbon	470 ohms 1/16W
R119	YF2116334JT	Carbon	330K ohms 1/16W
R120,124	YF2116224JT	Carbon	220K ohms 1/16W
R125	YF2116624JT	Carbon	620K ohms 1/16W
R126	YF2116103JT	Carbon	10K ohms 1/16W
R128	YF2116334JT	Carbon	330K ohms 1/16W
R129	YF2116224JT	Carbon	220K ohms 1/16W
R130	YF2116103JT	Carbon	10K ohms 1/16W
R131	YF2116224JT	Carbon	220K ohms 1/16W
R132	YF2116624JT	Carbon	620K ohms 1/16W
R133	YF2116331JT	Carbon	330 ohms 1/16W
R134	YF2116103JT	Carbon	10K ohms 1/16W
R135	YF2116334JT	Carbon	330K ohms 1/16W
R136,137	YF2116224JT	Carbon	220K ohms 1/16W
R138	YF2116624JT	Carbon	620K ohms 1/16W
R139	YF2116334JT	Carbon	330K ohms 1/16W
R140	YF2116224JT	Carbon	220K ohms 1/16W
R141	YF2116334JT	Carbon	330K ohms 1/16W
R142	YF2116224JT	Carbon	220K ohms 1/16W
R143	YF2116682JT	Carbon	6.8K ohms 1/16W
R144	YF2116823JT	Carbon	82K ohms 1/16W
R146	YF2116682JT	Carbon	6.8K ohms 1/16W
R147	YF2116103JT	Carbon	10K ohms 1/16W
R148	YF2116101JT	Carbon	100 ohms 1/16W
R149	YF2116221JT	Carbon	220 ohms 1/16W
R150	YF2116751JT	Carbon	750 ohms 1/16W
R151	YF2116222GT	Carbon	2.2K ohms 1/16W
R152	YF2116472GT	Carbon	4.7K ohms 1/16W
R153	YF2116101JT	Carbon	100 ohms 1/16W
R154	YF2116472GT	Carbon	4.7K ohms 1/16W
R155	YF2116332JT	Carbon	3.3K ohms 1/16W
R156	YF2116222GT	Carbon	2.2K ohms 1/16W
R157	YF2116472GT	Carbon	4.7K ohms 1/16W
R158	YF2116224JT	Carbon	220K ohms 1/16W
R159	YF2116472GT	Carbon	4.7K ohms 1/16W
R160,161	YF2116223JT	Carbon	22K ohms 1/16W
R162	YF2116122JT	Carbon	1.2K ohms 1/16W
R163	YF2116332JT	Carbon	3.3K ohms 1/16W
R164	YF2116472GT	Carbon	4.7K ohms 1/16W
R165	YF2116103JT	Carbon	10K ohms 1/16W
R166	YF2116153JT	Carbon	15K ohms 1/16W
R167	YF2116184JT	Carbon	180K ohms 1/16W
R168	YF2116683GT	Carbon	68K ohms 1/16W
R169	YF2116103JT	Carbon	10K ohms 1/16W
R170	YF2116223JT	Carbon	22K ohms 1/16W
R171,172	YF2116473GT	Carbon	47K ohms 1/16W
R173	YF2116333GT	Carbon	33K ohms 1/16W
R174	YF2116472GT	Carbon	4.7K ohms 1/16W
R175	YF2116104JT	Carbon	100K ohms 1/16W
R176	YF2116105GT	Carbon	1M ohms 1/16W
R177	YF2116103JT	Carbon	10K ohms 1/16W
R178	YF2116334JT	Carbon	330K ohms 1/16W
R179	YF2116224JT	Carbon	220K ohms 1/16W
R180	YF2116102GT	Carbon	1K ohms 1/16W
R181	YF2116153JT	Carbon	15K ohms 1/16W
R182	YF2116332JT	Carbon	3.3K ohms 1/16W
R183	YF2116101JT	Carbon	100 ohms 1/16W
R184	YF2116332JT	Carbon	3.3K ohms 1/16W
R185	YF2116182GT	Carbon	1.8K ohms 1/16W
R186,187	YF2116222GT	Carbon	2.2K ohms 1/16W
R188	YF2116103JT	Carbon	10K ohms 1/16W
R189	YF2116121JT	Carbon	120 ohms 1/16W
R190	YF2116103JT	Carbon	10K ohms 1/16W
R191	YF2116152JT	Carbon	1.5K ohms 1/16W
R192,193	YF2116471JT	Carbon	470 ohms 1/16W
R194	YF2116472GT	Carbon	4.7K ohms 1/16W
R195	YF2116682JT	Carbon	6.8K ohms 1/16W
R199	YF2116152JT	Carbon	1.5K ohms 1/16W
R200	YF2116334JT	Carbon	330K ohms 1/16W
R201	YF2116224JT	Carbon	220K ohms 1/16W
VR1	YWH0621A15K	Variable Resistor	15K ohms
VR2	YWH0621A4R7K	Variable Resistor	4.7K ohms
VR4,5	YFH0621A10K	Variable Resistor	10K ohms
VR6,7	YWH0621A47K	Variable Resistor	47K ohms
VR8	YFH0621A100K	Variable Resistor	100K ohms
VR9	YWH0621A47K	Variable Resistor	47K ohms
VR10	YFH0621A2R2K	Variable Resistor	2.2K ohms

REF.NO.	PART NO.	DESCRIPTION
VR11	YFH0621A150K	Variable Resistor 150K ohms
C1	YF400180CHJT	Ceramic 18 pF
C2	YF400100CHDT	Ceramic 10 pF
C3	YF400221CHJT	Ceramic 220 pF
C4	YF400100CHDT	Ceramic 10 pF
C5	YF400101CHJT	Ceramic 100 pF
C6	YF400100CHDT	Ceramic 10 pF
C10	YW400160CHJT	Ceramic 16 pF 50V (CH)
C11	YW400102CHJT	Ceramic 1000 pF
C12	ECEA1EK100	Electrolytic 10 µF 10V
C13	YF400104FZT	Ceramic 0.1 µF
C14-16	YF400471CHJT	Ceramic 470 pF
C17	ECEA1EK100	Electrolytic 10 µF 10V
C18	YF400221CHJT	Ceramic 220 pF
C19	ECEA1HKS010	Electrolytic 1 µF 50V
C20	YF400151CHJT	Ceramic 150 pF
C21	YF400104FZT	Ceramic 0.1 µF
C23	YF400471CHJT	Ceramic 470 pF
C24	YF400120CHJT	Ceramic 12pF CH
C25	YF400104FZT	Ceramic 0.1 µF
C26	YF400330CHJT	Ceramic 33 pF
C27	YF400103XKT	Ceramic 0.01 µF
C28	YF400270CHJT	Ceramic 27 pF
C29	YF400103XKT	Ceramic 0.01 µF
C30	ECSF1AE106	Tantalum 10 µF 10V
C50	ECEA1CKS101	Electrolytic 100 µF 16V
C51	YF400104FZT	Ceramic 0.1 µF
C52,53	YF400103XKT	Ceramic 0.01 µF
C54	YF400104FZT	Ceramic 0.1 µF
C55	YF400470CHJT	Ceramic 47 pF
C56	YF400680CHJT	Ceramic 68 pF CH
C57	YF400103XKT	Ceramic 0.01 µF
C58	YF400101CHJT	Ceramic 100 pF
C59	ECEA1AS470	Electrolytic 47 µF 10V
C60	YF400680CHJT	Ceramic 68 pF CH
C61	YF400102XKT	Ceramic 1000 pF
C64	YF400104FZT	Ceramic 0.1 µF
C65	YF400270CHJT	Ceramic 27 pF
C66	YF400103XKT	Ceramic 0.01 µF
C67	YF400150CHJT	Ceramic 15 pF
C68	YF400560CHJT	Ceramic 56 pF
C69	ECEA1CKS470	Electrolytic 47 µF 16V
C70,73	ECEA1HKS010	Electrolytic 1 µF 50V
C74	YF400100CHDT	Ceramic 10 pF
C75	ECEA1HKS010	Electrolytic 1 µF 50V
C76	YF400390CHJT	Ceramic 39 pF
C77	YF400103XKT	Ceramic 0.01 µF
C78,80	ECEA1HKS010	Electrolytic 1 µF 50V
C81	YF400104FZT	Ceramic 0.1 µF
C82	ECEA1HKS010	Electrolytic 1 µF 50V
C84	YW400102CHJT	Ceramic 1000 pF
C87	YF400100CHDT	Ceramic 10 pF
C88	ECEA1AS470	Electrolytic 47 µF 10V
C89	ECEA0JS470	Electrolytic 47 µF 6.3V
C90	YF400104FZT	Ceramic 0.1 µF

REF.NO.	PART NO.	DESCRIPTION
C91	ECEA1AS470	Electrolytic 47 µF 10V
C92,93	YF400102XKT	Ceramic 1000 pF
C94	ECEA0JKK100	Electrolytic 10 µF 6.3V
C95	YW400102CHJT	Ceramic 1000 pF
C96	ECEA1EK100	Electrolytic 10 µF 10V
C97	YW400102CHJT	Ceramic 1000 pF
C98	YF400101CHJT	Ceramic 100 pF
C99	ECEA1EK100	Electrolytic 10 µF 10V
C100	YF400471CHJT	Ceramic 470 pF
C101	YF400104FZT	Ceramic 0.1 µF
C102	YF400471CHJT	Ceramic 470 pF
C103	ECEA1EK100	Electrolytic 10 µF 10V
C104	ECQM1H104JZ	Plastic 0.1 µF 50V
C105	YF400102XKT	Ceramic 1000 pF
C106	ECSF1AE106	Tantalum 10 µF 10V
C107	YF400221CHJT	Ceramic 220 pF
C109	ECST1AC106ZR	Tantalum 10 µF 10V
C110	ECEA1HKS010	Electrolytic 1 µF 50V
C111	YF400121CHJT	Ceramic 120 pF
C112	ECEA0JS470	Electrolytic 47 µF 6.3V
C113	YF400103XKT	Ceramic 0.01 µF
C114	ECEA0JKK100	Electrolytic 10 µF 6.3V
C115,116	YF400104FZT	Ceramic 0.1 µF
C117	ECSF1AE225	Electrolytic 2.2 µF 10V
C118	YF400102XKT	Ceramic 1000 pF
C123	ECSF1AE106	Tantalum 10 µF 10V
C124	ECEA1AS470	Electrolytic 47 µF 10V
C126	YF400103XKT	Ceramic 0.01 µF
C127	YF400100CHDT	Ceramic 10 pF
C130	YF400104FZT	Ceramic 0.1 µF
C131	ECCF1H470JC	Ceramic 47 pF 50V
C132	ECCF1H560JC	Ceramic 56 pF 50V
CT1-3	YWCDX20APS	Trimmer Capacitor
L2	YFL52R2J	Coil 2.2 µH
L3	EL05SI8R2K	Coil 8.2 µH
L6	EL05SI470K	Coil 47 µH
L7	EL05SI8R2K	Coil 8.2 µH
L8,10	YFEL05SI2R2K	Coil 2.2 µH
L11	EL05SI100K	Coil 10 µH
X1	YWSC28375VC0	Crystal Oscillator
X2	YWSC17734VC0	Crystal Oscillator
X3	YWTC017734	Crystal Oscillator
J1-5	YF21160R00T	Jumper Resistor
CN-1	P/N69301-008	16 pin Connector
TP1	YW32BM7R5	Test pin

SHADING BOARD

REF.NO.	PART NO.	DESCRIPTION	
PCB8 (NLA	o YWVKCF200E4A	Printed Circuit Board Assy	
IC1,2	NJM4558M	IC	
IC3	MN4011BS	IC	
IC4	YWUPC4064G2	IC	
IC5	MN4053BS	IC	
IC6	MN4023BS	IC	
IC7,8	NJM4556M	IC	
Q1	2SD601-RS	Transistor	
Q2	2SB709-Q	Transistor	
Q3	2SD601-RS	Transistor	
Q4-7	2SB709-Q	Transistor	
Q8	2SK198-P	Transistor	
Q9	2SB709-Q	Transistor	
Q10,11	2SD601-RS	Transistor	
Q12	2SK198-P	Transistor	
Q13	2SD601-RS	Transistor	
Q14	2SB709-Q	Transistor	
Q15,16	2SD601-RS	Transistor	
Q17,18	2SB709-Q	Transistor	
Q19	2SB793-RS	Transistor	
Q20	2SD601-RS	Transistor	
Q21,22	2SB709-Q	Transistor	
Q23	2SD601-RS	Transistor	
Q24	2SB709-Q	Transistor	
Q25-28	2SD601-RS	Transistor	
Q29,30	2SD601-RS	Transistor	
D1	MA151WA	Diode	
D2	MA151K	Diode	
D3	MA151WK	Diode	
D4-6	MA151K	Diode	
R1	YF2116104GT	Carbon	100K ohms 1/16W
R2-4	YF2116103GT	Carbon	10K ohms 1/16W
R5	YF2116682GT	Carbon	6.8K ohms 1/16W
R6,7	YF2116103GT	Carbon	10K ohms 1/16W
R8,9	YF2116223GT	Carbon	22K ohms 1/16W
R10-14	YF2116103GT	Carbon	10K ohms 1/16W
R15,16	YF2116223GT	Carbon	22K ohms 1/16W
R17-22	YF2116154JT	Carbon	150K ohms 1/16W
R23	YF2116103GT	Carbon	10K ohms 1/16W
R24	YF2116104GT	Carbon	100K ohms 1/16W
R25-28	YF2116473GT	Carbon	47K ohms 1/16W
R29	YF2116223GT	Carbon	22K ohms 1/16W
R30	YF2116101GT	Carbon	100 ohms 1/16W
R31,32	YF2116682GT	Carbon	6.8K ohms 1/16W
R33	YF2116153GT	Carbon	15K ohms 1/16W
R34	YF2116472GT	Carbon	4.7K ohms 1/16W
R35	YF2116102GT	Carbon	1K ohms 1/16W
R36	YF2116104GT	Carbon	100K ohms 1/16W
R37	YF2116101GT	Carbon	100 ohms 1/16W
R38	YF2116103GT	Carbon	10K ohms 1/16W
R39	2116152GT	Carbon	1.5K ohms 1/16W
R40	YF2116104GT	Carbon	100K ohms 1/16W
R41	YF2116223GT	Carbon	22K ohms 1/16W
R42,43	YF2116104GT	Carbon	100K ohms 1/16W
R44	R1220P822D	Metal	8.2K ohms
R45	YWR1220P242D	Metal	2.4K ohms
R46	YF2116473GT	Carbon	47K ohms 1/16W
R47	YF2116102GT	Carbon	1K ohms 1/16W
R48	YF2116101GT	Carbon	100 ohms 1/16W
R49	YF2116472GT	Carbon	4.7K ohms 1/16W
R50	YF2116473GT	Carbon	47K ohms 1/16W
R51	YF2116334JT	Carbon	330K ohms 1/16W
R52	YF2116223GT	Carbon	22K ohms 1/16W
R54	YF2116154GT	Carbon	150K ohms 1/16W
R55	YF2116103GT	Carbon	10K ohms 1/16W
R56	YF2116332GT	Carbon	3.3K ohms 1/16W
R58,59	YF2116333GT	Carbon	33K ohms 1/16W
R60,61	YF2116104GT	Carbon	100K ohms 1/16W
R62	YF2116332GT	Carbon	3.3K ohms 1/16W
R63	YF2116223GT	Carbon	22K ohms 1/16W
R64	YF2116103GT	Carbon	10K ohms 1/16W
R65	YF2116101GT	Carbon	100 ohms 1/16W
R66,67	YF2116103GT	Carbon	10K ohms 1/16W
R68	YF2116473GT	Carbon	47K ohms 1/16W
R69	YF2116332GT	Carbon	3.3K ohms 1/16W
R70	YF2116473GT	Carbon	47K ohms 1/16W
R71	YF2116682GT	Carbon	6.8K ohms 1/16W
R72	YF2116102GT	Carbon	1K ohms 1/16W
R73	YF2116104GT	Carbon	100K ohms 1/16W
R74	YF2116103GT	Carbon	10K ohms 1/16W
R75	YF2116101GT	Carbon	100 ohms 1/16W
R76	YF2116473GT	Carbon	47K ohms 1/16W
R77	YF2116104GT	Carbon	100K ohms 1/16W
R78	YF2116332GT	Carbon	3.3K ohms 1/16W
R79	YF2116333GT	Carbon	33K ohms 1/16W
R80	YF2116332GT	Carbon	3.3K ohms 1/16W
R81	YF2116102GT	Carbon	1K ohms 1/16W
R82	YF2116104GT	Carbon	100K ohms 1/16W
R83	YF2116473GT	Carbon	47K ohms 1/16W
R84	YF2116223GT	Carbon	22K ohms 1/16W
R85	YF2116104GT	Carbon	100K ohms 1/16W
R86	YF2116103GT	Carbon	10K ohms 1/16W
R87	YF2116473GT	Carbon	47K ohms 1/16W
R88	YF2116103GT	Carbon	10K ohms 1/16W
R89	YF2116223GT	Carbon	22K ohms 1/16W
R90,91	YF2116473GT	Carbon	47K ohms 1/16W
R92	YF2116104GT	Carbon	100K ohms 1/16W
R96	YF2116122GT	Carbon	1.2K ohms 1/16W
R99	YF2116562GT	Carbon	5.6K ohms 1/16W
R100	YF2116104GT	Carbon	100K ohms 1/16W
R102,103	YF2116563GT	Carbon	56K ohms 1/16W
R104,105	YF2116472GT	Carbon	4.7K ohms 1/16W
R106-109	YF2116222GT	Carbon	2.2K ohms 1/16W
R110	YF2116223GT	Carbon	22K ohms 1/16W
R111	YF2116182GT	Carbon	1.8K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R112	YF2116272GT	Carbon	2.7K ohms 1/16W
R113	YF2116182GT	Carbon	1.8K ohms 1/16W
R114	YF2116272GT	Carbon	2.7K ohms 1/16W
R115-117	YF2116222GT	Carbon	2.2K ohms 1/16W
R118	2116152GT	Carbon	1.5K ohms 1/16W
R119,120	YF2116103JT	Carbon	10K ohms 1/16W
R121	YF2116223JT	Carbon	22K ohms 1/16W
R122	YF2116103JT	Carbon	10K ohms 1/16W
R123	YF2116223JT	Carbon	22K ohms 1/16W
R124	YF2116103JT	Carbon	10K ohms 1/16W
R125	YF2116223JT	Carbon	22K ohms 1/16W
R126	YF2116103JT	Carbon	10K ohms 1/16W
R127	YF2116473GT	Carbon	47K ohms 1/16W
R128,129	YF2116153JT	Carbon	15K ohms 1/16W
R133	ERDS2TJ183	Carbon	18K ohms 1/8W
VR1-6	YWH0621A47K	Variable Resistor	47K ohms
VR7	YFH0621A10K	Variable Resistor	10K ohms
VR8	EVM8AGA00B13	Variable Resistor	1K ohms
VR9	YWH0621A4R7K	Variable Resistor	4.7K ohms
VR10	YFH0621A220K	Variable Resistor	220Kohms
VR11	YFH0621A10K	Variable Resistor	10K ohms
VR12	PK502H103H0A	Variable Resistor	10K ohms
VR13,14	PK502H502H0A	Variable Resistor	5K ohms
VR15	PK502H202H0A	Variable Resistor	2K ohms
VR16,17	PK502H502H0A	Variable Resistor	5K ohms
VR18-20	EVM13SW00B15	Variable Resistor	100K ohms
C1,2	ECEA1AS470	Electrolytic	47 μF 10V
C3	ECQM1H332KV	Plastic	3300 pF 50V
C4	ECEA1CKS470	Electrolytic	47 μF 16V
C5	ECEA1AS470	Electrolytic	47 μF 10V
C6	ECSF1VE684	Tantalum	0.68 μF 35V
C7-10	ECEA1AS470	Electrolytic	47 μF 10V
C12	ECEA1AS470	Electrolytic	47 μF 10V
C14	ECSF1CE225	Tantalum	2.2 μF 16V
C15	YF400102XKT	Ceramic	1000 pF
C16	RPE122C104M	Ceramic	0.1 μF
C17	YF400104FZT	Ceramic	0.1 μF
C18	ECEA0JS470	Electrolytic	47 μF 6.3V
C19	RPE122C473K	Ceramic	0.047 μF
C20	ECEA1CKA101	Electrolytic	100 μF 16V
C21	ECEA1EK100	Electrolytic	10 μF 10V
C22	ECEA1EKS100	Electrolytic	10 μF 25V
C23	ECEA1EKA470	Electrolytic	47 μF 25V
C24	YF400104FZT	Ceramic	0.1 μF
C25,26	YF400102XKT	Ceramic	1000 pF
C27-29	ECEA1CKS100	Electrolytic	10 μF 16V
C30	YF400104FZT	Ceramic	0.1 μF
C31	ECSF1AE226	Tantalum	22 μF 10V
C32	YF400101CHJT	Ceramic	100 pF
C33	ECEA1ASN330	Electrolytic	33 μF 10V
SW1	YWSSS322	Slide Switch	
SW3	YFSSS323L4	Slide Switch	
SW4	YWSKHHBS	Push Switch	
SW5,6	YWSSS322	Slide Switch	
J57,94	YF21160R00T	Jumper Resistor	

REF.NO.	PART NO.	DESCRIPTION
J97,101	YF21160R00T	Jumper Resistor
CN1-JM	EMCS0350Z	3 pin Jack Male
CN2-JM	EMCS1050Z	10 pin Jack Male
TP1-6	YW32BM7R5	Test pin

MOTHER BOARD

REF.NO.	PART NO.	DESCRIPTION	
PCB9 (NLA)	o YWVKYF50HP1A	Printed Circuit Board Assy	
IC1-3	MN4053BS	IC	
IC4	YWUPC4062G2	IC	
IC6,7	MN4053BS	IC	
Q1-3	2SD601-RS	Transistor	
Q4	2SB710-Q	Transistor	
D1,2	MA151WA	Diode	
D3	MA151A	Diode	
D4	MA151WK	Diode	
D5	MA151WA	Diode	
D6	MA4082M	Diode	
R1	YF2116104JT	Carbon	100K ohms 1/16W
R2	YF2116103JT	Carbon	10K ohms 1/16W
R3-5	YFR1220P104D	Metal	100K ohms
R6-9	YWR1220P103D	Metal	10K ohms
R10	YWR1220P273D	Metal	27K ohms
R11	YWR1220P103D	Metal	10K ohms
R12,14	YF2116104JT	Carbon	100K ohms 1/16W
R16	YF2116223JT	Carbon	22K ohms 1/16W
R17	YF2116103JT	Carbon	10K ohms 1/16W
R18	YF2116472GT	Carbon	4.7K ohms 1/16W
R19-21	YF2116104JT	Carbon	100K ohms 1/16W
R22	YF2116750JT	Carbon	75 ohms 1/16W
R23-25	YF2116103JT	Carbon	10K ohms 1/16W
R26-28	YF2116101JT	Carbon	100 ohms 1/16W
R29	YF2116103JT	Carbon	10K ohms 1/16W
R30-32	YF2116101JT	Carbon	100 ohms 1/16W
R34-36	YF2116101JT	Carbon	100 ohms 1/16W
R37-39	YF2116104JT	Carbon	100K ohms 1/16W
R40-43	YF2116103JT	Carbon	10K ohms 1/16W
R44	YF2116223JT	Carbon	22K ohms 1/16W
R45	YF2116392JT	Carbon	3.9K ohms 1/16W
R48	YF2116562JT	Carbon	5.6K ohms 1/16W
R49	YF2116121JT	Carbon	120 ohms 1/16W
C1-4	YF400104FZT	Ceramic	0.1 μF
C6,8	YF400224FZT	Ceramic	0.22 μF
C9	ECEA1CK101	Electrolytic	100 μF 16V
C10	YF400104FZT	Ceramic	0.1 μF
C12	ECEA1AS470	Electrolytic	47 μF 10V
C13-15	YF400104FZT	Ceramic	0.1 μF
C16	YF400120CHJT	Ceramic	12 pF
L1	YWEL05SI2R7K	Coil	2.7 μH
CF	YW2673000101	Filter	
J1,3	YF21160R00T	Jumper Resistor	

REF.NO.	PART NO.	DESCRIPTION
J5,7	YF21160R00T	Jumper Resistor
J12,15	YF21160R00T	Jumper Resistor
J18-20	YF21160R00T	Jumper Resistor
CN1-JM	EMCS0650ZL	6 pin Jack Male
CN2-JM	EMCS0850ZL	8 pin Jack Male
CN3-JM	EMCS1150ZL	11 pin Jack Male
CN4-JM	EMCS0650ZL	6 pin Jack Male
CN5,6-JM	EMCS1250ZL	12 pin Jack Male
CN7,8-JM	EMCS0450ZL	4 pin Jack Male
CN9-JM	EMCS1050ZL	10 pin Jack Male
CN10-JM	YWEMCS0950ZL	9 pin Jack Male
CN11	EMCS0250ZL	2 pin Jack Male
CN12	YWXC5A-5022	22 pin Multi-pin Connector
CN101	P/N68933-232	32 pin Multi-pin Connector
CN102	P/N68933-224	24 pin Multi-pin Connector
CN103	P/N68933-246	46 pin Multi-pin Connector
CN104	P/N68933-224	24 pin Multi-pin Connector
CN105	P/N68933-234	34 pin Multi-pin Connector
CN106	P/N68933-232	32 pin Multi-pin Connector
CN107	P/N68933-224	24 pin Multi-pin Connector
TP1-15	YW32BM2R5	Test pin

POWER LED BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB10	o YWVRZF50HP4A	Printed Board
D1	LN11WP23	LED
SW1	YFSPH222A	Push Switch

SIDE SWITCH BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB11 (NLA)	o YWVKYF50HP2A	Printed Circuit Board Assy
Q1	2SB710-Q	Transistor
D1	MA151K	Diode
	MA4082M	Diode
D2-8	MA151K	Diode
R1-5	YF2116333GT	Carbon 33K ohms 1/16W
R6	ERDS2TJ222	Carbon 2.2K ohms 1/4W
R7	ERDS2TJ122	Carbon 1.2K ohms 1/4W
R8	YF2116562JT	Carbon 5.6K ohms 1/16W
R9	YF2116563JT	Carbon 56K ohms 1/16W
R10	ERDS2TJ821	Carbon 820 ohms 1/4W
SW1,2	YWMEG7103G	Toggle Switch
SW3	YWMEG7101G	Toggle Switch
SW4	YWMTKG7211G	Toggle Switch
CN1-JM	EMCS0450Z	4 pin Jack Male

FRONT SWITCH BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB12 (NLA)	o YWVKZF50HP2A	Printed Circuit Board Assy
R1,2	ERDS2TJ333	Carbon 33K ohms 1/4W
SW1	YWMEG7103G	Toggle Switch
SW2	YWMTKG7105G	Toggle Switch
CN1-JM	EMCS0250Z	2 pin Jack Male,

REC SWITCH BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB13	o YWVRZF50HP3A	Printed Board
SW1	YWSKHGAA	Push Switch

PREAMPLIFIER BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB14 (NLA)	o YWVKBF200E5A	Printed Circuit Board Assy
IC1	YWUPC4064G2	IC
IC3	M51266FP	IC
IC4	MN74HC4053S	IC
IC5,6	M51266FP	IC
Q2,4	2SB793A-RS	Transistor
Q5,6	2SB793A-RS	Transistor
Q7	2SC2404-CDTW	Transistor
Q8	2SD601-RS	Transistor
Q9,10	2SA1226-E3	Transistor
Q11	2SD601-RS	Transistor
Q12	2SB710-Q	Transistor
Q13,14	2SC2404-CDTW	Transistor
Q15	2SD601-RS	Transistor
Q16	2SC2404-CDTW	Transistor
Q17	2SD601-RS	Transistor
Q18,19	2SA1226-E3	Transistor
Q20	2SD601-RS	Transistor
Q21,22	2SC2404-CDTW	Transistor
Q23	2SD601-RS	Transistor
Q24	2SC2404-CDTW	Transistor
Q25	2SD601-RS	Transistor
Q26,27	2SA1226-E3	Transistor
Q28	2SD601-RS	Transistor
Q29,30	2SC2404-CDTW	Transistor
Q31	2SD601-RS	Transistor
Q32-34	2SB709-Q	Transistor
Q35-37	2SD601-RS	Transistor
R3,4	YF2116272JT	Carbon 2.7K ohms 1/16W
R5	YF2116392JT	Carbon 3.9K ohms 1/16W
R6	YF2116471JT	Carbon 470 ohms 1/16W
R7	YF2116472GT	Carbon 4.7K ohms 1/16W
R8	YF2116471JT	Carbon 470 ohms 1/16W
R9	YF2116332JT	Carbon 3.3K ohms 1/16W
R10	YFR1220P113D	Metal 11K ohms
R11	R1220P123D	Metal 12K ohms

REF.NO.	PART NO.	DESCRIPTION	
R12,13	YWR1220P103D	Metal	10K ohms
R20	YF2116471JT	Carbon	470 ohms 1/16W
R21	YF2116331JT	Carbon	330 ohms 1/16W
R22	YFR1220P113D	Metal	11K ohms
R23	R1220P123D	Metal	12K ohms
R24,25	YWR1220P103D	Metal	10K ohms
R26	YF2116471JT	Carbon	470 ohms 1/16W
R27	YF2116152JT	Carbon	1.5K ohms 1/16W
R28	YFR1220P113D	Metal	11K ohms
R29	R1220P123D	Metal	12K ohms
R30,31	YWR1220P103D	Metal	10K ohms
R32	YF2116471JT	Carbon	470 ohms 1/16W
R33	YF2116331JT	Carbon	330 ohms 1/16W
R34	R1220P123D	Metal	12K ohms
R35	YWR1220P103D	Metal	10K ohms
R36,37	YWR1220P563D	Metal	56K ohms
R38	YF2116101JT	Carbon	100 ohms 1/16W
R39	YF2116682JT	Carbon	6.8K ohms 1/16W
R40	YF2116332JT	Carbon	3.3K ohms 1/16W
R41	YF2116101JT	Carbon	100 ohms 1/16W
R42	YF2116242GT	Carbon	2.4K ohms 1/16W
R43	YF2116223JT	Carbon	22K ohms 1/16W
R45	YF2116333GT	Carbon	33K ohms 1/16W
R46	YF2116562JT	Carbon	5.6K ohms 1/16W
R47	YF2116102GT	Carbon	1K ohms 1/16W
R48	YF2116752JT	Carbon	7.5K ohms 1/16W
R49	YF2116113JT	Carbon	11K ohms 1/16W
R50,51	YF2116332JT	Carbon	3.3K ohms 1/16W
R52	YF2116101JT	Carbon	100 ohms 1/16W
R53	YF2116182GT	Carbon	1.8K ohms 1/16W
R54	YF2116302GT	Carbon	3K ohms 1/16W
R55	YF2116102GT	Carbon	1K ohms 1/16W
R56	YF2116823JT	Carbon	82K ohms 1/16W
R57	YF2116102GT	Carbon	1K ohms 1/16W
R58	YF2116122JT	Carbon	1.2K ohms 1/16W
R59	YF2116472GT	Carbon	4.7K ohms 1/16W
R60	YF2116102GT	Carbon	1K ohms 1/16W
R61	YF2116682JT	Carbon	6.8K ohms 1/16W
R62	YF2116152JT	Carbon	1.5K ohms 1/16W
R63,64	YF2116101JT	Carbon	100 ohms 1/16W
R65	YF2116682JT	Carbon	6.8K ohms 1/16W
R66	YF2116332JT	Carbon	3.3K ohms 1/16W
R67	YF2116101JT	Carbon	100 ohms 1/16W
R68	YF2116242GT	Carbon	2.4K ohms 1/16W
R69	YF2116223JT	Carbon	22K ohms 1/16W
R71	YF2116333GT	Carbon	33K ohms 1/16W
R72	YF2116562JT	Carbon	5.6K ohms 1/16W
R73	YF2116102GT	Carbon	1K ohms 1/16W
R74	YF2116752JT	Carbon	7.5K ohms 1/16W
R75	YF2116113JT	Carbon	11K ohms 1/16W
R76,77	YF2116332JT	Carbon	3.3K ohms 1/16W
R78	YF2116101JT	Carbon	100 ohms 1/16W
R79	YF2116102GT	Carbon	1K ohms 1/16W
R80	YF2116823JT	Carbon	82K ohms 1/16W
R81	YF2116102GT	Carbon	1K ohms 1/16W
R82	YF2116122JT	Carbon	1.2K ohms 1/16W
R83	YF2116472GT	Carbon	4.7K ohms 1/16W
R84	YF2116102GT	Carbon	1K ohms 1/16W
R85	YF2116682JT	Carbon	6.8K ohms 1/16W
R86	YF2116152JT	Carbon	1.5K ohms 1/16W
R87,88	YF2116101JT	Carbon	100 ohms 1/16W
R89	YF2116682JT	Carbon	6.8K ohms 1/16W
R90	YF2116332JT	Carbon	3.3K ohms 1/16W
R91	YF2116101JT	Carbon	100 ohms 1/16W
R92	YF2116242GT	Carbon	2.4K ohms 1/16W
R93	YF2116223JT	Carbon	22K ohms 1/16W
R95	YF2116333GT	Carbon	33K ohms 1/16W
R96	YF2116562JT	Carbon	5.6K ohms 1/16W
R97	YF2116102GT	Carbon	1K ohms 1/16W
R98	YF2116752JT	Carbon	7.5K ohms 1/16W
R99	YF2116113JT	Carbon	11K ohms 1/16W
R100,101	YF2116332JT	Carbon	3.3K ohms 1/16W
R102	YF2116101JT	Carbon	100 ohms 1/16W
R103	YF2116102GT	Carbon	1K ohms 1/16W
R104	YF2116823JT	Carbon	82K ohms 1/16W
R105	YF2116102GT	Carbon	1K ohms 1/16W
R106	YF2116122JT	Carbon	1.2K ohms 1/16W
R107	YF2116472GT	Carbon	4.7K ohms 1/16W
R108	YF2116102GT	Carbon	1K ohms 1/16W
R109	YF2116682JT	Carbon	6.8K ohms 1/16W
R110	YF2116152JT	Carbon	1.5K ohms 1/16W
R111	YF2116101JT	Carbon	100 ohms 1/16W
R112-114	YF2116562JT	Carbon	5.6K ohms 1/16W
R115	YF2116102GT	Carbon	1K ohms 1/16W
R116	YF2116152JT	Carbon	1.5K ohms 1/16W
R117-119	YF2116102GT	Carbon	1K ohms 1/16W
R120-122	ERDS2TJ473	Carbon	47K ohms 1/4W
R123,124	ERDS2FJ101	Carbon	100 ohms 1/4W
VR1-3	EVML3GA00B24	Variable Resistor	20Kohms
VR4-6	EVML3GA00B13	Variable Resistor	1K ohms
C2-4	ECEA0GKK220	Electrolytic	22 µF 4V
C5	ECEA1EU101	Electrolytic	100 µF 25V
C6	ECEA1CK220	Electrolytic	22 µF 16V
C9	ECEA0JKS101	Electrolytic	100 µF 6.3V
C10	ECEA0GKK220	Electrolytic	22 µF 4V
C11	ECEA1ASS101	Electrolytic	100 µF 10V
C12	ECEA0JK220	Electrolytic	22 µF 6.3V
C13	ECEA0JKS101	Electrolytic	100 µF 6.3V
C14	ECEA0GKK220	Electrolytic	22 µF 4V
C15	YF400820CHJT	Ceramic	82 pF
C16	ECSF1AE106	Electrolytic	10 µF 10V
C19	YF400104FZT	Ceramic	0.1 µF
C20,21	ECEA0JS470	Electrolytic	47 µF 6.3V
C22	ECEA0GKK220	Electrolytic	22 µF 4V
C23	ECSF1AE106	Electrolytic	10 µF 10V
C24	ECEA0GKS101	Electrolytic	100 µF 4V
C25	YF400220CHJT	Ceramic	22 pF
C26	YF400120CHJT	Ceramic	12 pF CH
C27	YF400820CHJT	Ceramic	82 pF
C28	ECSF1AE106	Electrolytic	10 µF 10V

REF.NO.	PART NO.	DESCRIPTION
C31	YF400104FZT	Ceramic 0.1 µF
C32,33	ECEA0JS470	Electrolytic 47 µF 6.3V
C34	ECEA0GKK220	Electrolytic 22 µF 4V
C35	YF400220CHJT	Ceramic 22 pF
C36	YF400120CHJT	Ceramic 12 pF CH
C37	YF400820CHJT	Ceramic 82 pF
C38	ECSF1AE106	Electrolytic 10 µF 10V
C41	YF400104FZT	Ceramic 0.1 µF
C42,43	ECEA0JS470	Electrolytic 47 µF 6.3V
C44	ECEA0GKK220	Electrolytic 22 µF 4V
C45	YF400220CHJT	Ceramic 22 pF
C46	YF400120CHJT	Ceramic 12 pF CH
C47	ECEA1AKS330	Electrolytic 33 µF 10V
C48	ECEA0JS470	Electrolytic 47 µF 6.3V
C49	ECEA1AKS330	Electrolytic 33 µF 10V
C50	ECEA0JS470	Electrolytic 47 µF 6.3V
C51	ECEA1AKS330	Electrolytic 33 µF 10V
C52	ECEA0JS470	Electrolytic 47 µF 6.3V
C55-60	ECSF1AE106	Electrolytic 10 µF 10V
C61-63	ECEA0GKK220	Electrolytic 22 µF 4V
C64	ECSF1VE475	Electrolytic 4.7 µF 35V
C65	ECSF1AE106	Electrolytic 10 µF 10V
C66	ECSF1VE475	Electrolytic 4.7 µF 35V
C67	ECSF1AE106	Electrolytic 10 µF 10V
C68	ECSF1CE106	Electrolytic 10 µF 16V
C69	ECSF1AE106	Electrolytic 10 µF 10V
L1-3	YWF3216A4R7K	Coil 4.7 µH
L4	YFF3216A2R2K	Coil 2.2 µH
L5-10	YWF3216A4R7K	Coil 4.7 µH
L11	EL05SI100K	Coil 10 µH
L12-17	ELEXH470JA	Coil 47 µH
CF1-3	YWF05W2356	Filter
J1	YF21160R00T	Jamper
CN1-JM	YW12SDD4TS11	12 pin Connector
CN2-4-JM	EMCS0250Z	2 pin Jack Male
CN5-JM	EMCS1050Z	10 pin Jack Male
CN6-JM	EMCS0250Z	2 pin Jack Male
TP1-9	YW32BM7R5	Test pin

CCD DRIVE BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB15 (NLA)	o YWVKCF200E5A	Printed Circuit Board Assy
IC1	YWCX20180	IC
IC4	MN74HC4049S	IC
IC5	CX23047B	LSI
IC7	MN74HC367S	IC
IC8,11	MN74HC4050S	IC
IC12	MN74HC4050S	IC
Q2	2SD602-QRS	Transistor
Q4	2SD973A-RS	Transistor
Q5	2SB710-Q	Transistor
Q6-8	2SC2404-CDTW	Transistor
D1-3	MA151WA	Diode
D4,5	MA151A	Diode
D6	MA4051M	Diode
D7	MA153	Diode
D8	MA151A	Diode
R1-4	YF2116104JT	Carbon 100K ohms 1/16W
R5	YF2116333GT	Carbon 33K ohms 1/16W
R15	YF2116682JT	Carbon 6.8K ohms 1/16W
R16	YF2116183GT	Carbon 18K ohms 1/16W
R19	YF2116105GT	Carbon 1M ohms 1/16W
R21	YF2116221JT	Carbon 220 ohms 1/16W
R25	YF2116151JT	Carbon 150 ohms 1/16W
R26	YF2116220JT	Carbon 22 ohms 1/16W
R28	YF2116273GT	Carbon 27K ohms 1/16W
R29	YF2116823JT	Carbon 82K ohms 1/16W
R30	YF2116273GT	Carbon 27K ohms 1/16W
R31	YF2116823JT	Carbon 82K ohms 1/16W
R32	YF2116273GT	Carbon 27K ohms 1/16W
R33	YF2116823JT	Carbon 82K ohms 1/16W
R34	YF2116183GT	Carbon 18K ohms 1/16W
R35	YF2116563JT	Carbon 56K ohms 1/16W
R36	YF2116163JT	Carbon 16K ohms 1/16W
R37	YF2116683GT	Carbon 68K ohms 1/16W
R38	YF2116822JT	Carbon 8.2K ohms 1/16W
R39	YF2116104JT	Carbon 100K ohms 1/16W
R40	YF2116392JT	Carbon 3.9K ohms 1/16W
R43	YF2116683GT	Carbon 68K ohms 1/16W
R44	YF2116473GT	Carbon 47K ohms 1/16W
R47	YF2116222GT	Carbon 2.2K ohms 1/16W
R48	YF2116682JT	Carbon 6.8K ohms 1/16W
R49	YF2116220JT	Carbon 22 ohms 1/16W
R51,52	YF2116222GT	Carbon 2.2K ohms 1/16W
R54-57	YF2116103JT	Carbon 10K ohms 1/16W
R58	YF2116101JT	Carbon 100 ohms 1/16W
R61	YF2116681GT	Carbon 680 ohms 1/16W
R63,64	YF2116151GT	Carbon 150 ohms 1/16W
R67,68	YF2116151GT	Carbon 150 ohms 1/16W
R71,72	YF2116151GT	Carbon 150 ohms 1/16W
R74	YF2116152JT	Carbon 1.5K ohms 1/16W
R75	YF2116911JT	Carbon 910 ohms 1/16W
R76	YF2116432JT	Carbon 4.3K ohms 1/16W
R77	YF2116431JT	Carbon 430 ohms 1/16W
R78	YF2116152JT	Carbon 1.5K ohms 1/16W
R79	YF2116911JT	Carbon 910 ohms 1/16W
R80	YF2116432JT	Carbon 4.3K ohms 1/16W
R81	YF2116431JT	Carbon 430 ohms 1/16W
R82	YF2116152JT	Carbon 1.5K ohms 1/16W
R83	YF2116911JT	Carbon 910 ohms 1/16W
R84	YF2116432JT	Carbon 4.3K ohms 1/16W
R85	YF2116431JT	Carbon 430 ohms 1/16W
VR1,2	EVML3GA00B13	Variable Resistor 1K ohms
C2-5	ECEA1HKSR47	Electrolytic 0.47µ F 50V (KS)
C6	ECEA1EK3R3	Electrolytic 3.3 µF 25V

REF.NO.	PART NO.	DESCRIPTION
C7,8	ECEA1HKS010	Electrolytic 1 µF 50V
C9	ECEA1AS470	Electrolytic 47 µF 10V
C10	ECEA1HKSR47	Electrolytic 0.47 µF 50V (KS)
C13	ECEA1EK470	Electrolytic 47 µF 25V
C15-17	ECSF1AE476	Tantalum 47 µF 10V
C18	YF400103XKT	Ceramic 0.01 µF
C24	YF400330CHJT	Ceramic 33 pF
C25	ECSF1AE476	Tantalum 47 µF 10V
C26,27	YF400330CHJT	Ceramic 33 pF
C28	ECSF1AE476	Tantalum 47 µF 10V
C30	YF400104FZT	Ceramic 0.1 µF
C31	ECEA1CKS470	Electrolytic 47 µF 16V
C32	YF400104FZT	Ceramic 0.1 µF
C33	ECEA1EK470	Electrolytic 47 µF 25V
C34	ECSF1CE106	Tantalum 10 µF 16V
C36,37	YF400820CHJT	Ceramic 82 pF
C38	YF400101CHJT	Ceramic 100 pF
C39	YF400104FZT	Ceramic 0.1 µF
C40	ECEA0JKS101	Electrolytic 100 µF 6.3V
C43	YF400470CHJT	Ceramic 47 pF
C44	ECSF1AE476	Tantalum 47 µF 10V
C47,48	YF400390CHJT	Ceramic 39 pF
C52,53	YF400390CHJT	Ceramic 39 pF
C54	ECSF1AE476	Tantalum 47 µF 10V
C58,59	YF400390CHJT	Ceramic 39 pF
C61-63	ECSF1AE106	Tantalum 10 µF 10V
L1,2	YWF3216A4R7K	Coil 4.7 µH
L5,6	YFF3216E8R2K	Coil 8.2 µH
L7,8	YFEL05SI2R2K	Coil 2.2 µH
L9-12	YFF3216E8R2K	Coil 8.2 µH
L13-15	ELEXH470JA	Coil 47 µH
J17	YF21160R00T	Jumper Resistor
J27,50	YF21160R00T	Jumper Resistor
J59,60	YF21160R00T	Jumper Resistor
CN1	YW5597-19APB	19 pin Connector
CN2-JM	EMCS0650Z	6 pin Jack Male
CN3	YW12PED4T1-1	12 pin Connector

FILTER SENSOR BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB16	o YWVRZF50HP5A	Printed Board
VS1,2	YWNJL5146EA	Semiconductor

FILTER COIL BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB17	o YWVRZF50HP6A	Printed Board
L1	YFLH10D500K	Coil 50 µH

CAMERA ADAPTOR

MISCELLANEOUS

REF.NO.	PART NO.	DESCRIPTION
D1	o ESAB82M004	Diode
C101	ECKF1E104ZV	Ceramic 0.1 µF 25V
SW1	o YWME7101G	Power Selector Switch
JK1	YFHSJ88211A	Audio Monitor Jack
JK2	o YWQMA1221B	DC Battery Connector Jack
JK3	YWLJ145-1A	Intercom Jack
CN1,2	YWDBNCR	Battery/GEN-LOCK Connector
CN3	YFJMR2532M	32 pin VTR/RCU Connector
CN4	o YFXLR432F512	EXT DC Connector
M1	o YWV5EA0426D1	C/A Main Cover
M2	YWA620AER01	Insulator Washer
M3	YWV5EA0462A3	Bottom Cover
M4	YWV5VB0048A4	Pad
M5	YWV1EA0075B4	Special Screw for C/A Main Cover
M6	YWV4JA0153A4	Coil Spring
M7	YFV2EB0028B4	Guide
M8	YWV1KA0028A4	Earth Lag
M9	o YWV5EA0427C1	Operation Cover
M10	YFV2SA0200B4	Mounting Angle for DC Jack
M11	YFV2SA0319A4	Mounting Angle for Switch Board
M12	o YWV2TA0088B4	Mounting Base for BNC Connector
M13	o YWV7SA0770A2	C/A Indication Label
M14	o YWV7SA0800A4	S,VHS Indication Label
M15	o YWV5EA0428A1	Rear Cover
M16	o YWV5MA0024A4	Shoe
M17	YWV1EB0070A3	Special Screw for Rear Cover
M18	YWV1KA0039A4	Polyethylene Washer
M19	YWV4JA0152A4	Coil Spring for Rear Cover
M20	YWV2EA0055A4	Connector Guide
M21	YWV4JA0154B4	Coil Spring for Connector Guide
M22	YWV2XA0002A4	Protector
M23 ⚠	o YWV7QA1631A4	Main Label
M24	o YWV2NA0190A4	Insulator Label
M25	YFV7MA0099A4	Caution Label
M27	o YWA2PA0053B4	Insulator Tube
M28	o YWA2PA0054A4	Insulator Washer A
M29	o YWV1KA0023B4	Insulator Washer B
M31	o YWV2TA0154A4	Mounting Base
M32	o YWV2CA0243A4	Mounting Angle
M33	o YWV2FA0354A4	Cushion

MAIN BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB1 (NLA)	o YWVKZAD42P1A	Printed Circuit Board Assy
IC1	MN4023BS	IC
IC2	NJM2903M	IC
IC3	NJM2904M	IC
IC4	YWNJM387D	IC

REF.NO.	PART NO.	DESCRIPTION	
IC5	MN4053BS	IC	
IC6	YFNJM386D	IC	
IC7	MN4053BS	IC	
IC8	NJM2903M	IC	
IC9-11	YWUPC4064G2	IC	
IC12	MN4050BS	IC	
IC13	YWUPC4064G2	IC	
IC14	MN4538BS	IC	
IC15	M5231L	IC	
IC16	TL7700CPS	IC	
IC17,18	MN4051BS	IC	
IC19	MN4071BS	IC	
IC20	MN4011BS	IC	
IC21	MN4050BS	IC	
IC22	TP4508NP	IC	
IC23	M46015	IC	
IC24	NJM2904M	IC	
IC25	YWM51957BL	IC	
IC26	NJM2903M	IC	
Q1	2SD973A-RS	Transistor	
Q2-5	2SD601-RS	Transistor	
Q6	2SB709-Q	Transistor	
Q7	2SD602-QRS	Transistor	
Q8,9	2SD601-RS	Transistor	
Q10,11	2SD602-QRS	Transistor	
Q12,13	2SB709-Q	Transistor	
Q14	2SD601-RS	Transistor	
Q15	2SB709-Q	Transistor	
Q17	2SB793-RS	Transistor	
Q18-21	2SD601-RS	Transistor	
Q25	2SD601-RS	Transistor	
Q26	2SB709-Q	Transistor	
Q27	2SD601-RS	Transistor	
Q28	2SB709-Q	Transistor	
Q29	2SD601-RS	Transistor	
Q30	2SB709-Q	Transistor	
Q31	2SD601-RS	Transistor	
Q32	2SB793-RS	Transistor	
Q33-38	2SD601-RS	Transistor	
Q39	2SB709-Q	Transistor	
Q40	2SD601-RS	Transistor	
Q41,42	2SB709-Q	Transistor	
Q43	2SD601-RS	Transistor	
D1	MA151WK	Diode	
D2	MA151K	Diode	
D3,4	YWERA81-004	Diode	
D5	MA151A	Diode	
D7	MA4091M	Diode	
D8	MA151K	Diode	
R1,2	ERDS2FJ331	Carbon	330 ohms 1/4W
R3	YF2116104JT	Carbon	100K ohms 1/16W
R4	YF2116102GT	Carbon	1K ohms 1/16W
R5	YF2116103JT	Carbon	10K ohms 1/16W
R6	YF2116104JT	Carbon	100K ohms 1/16W
R7	YF2116223JT	Carbon	22K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R8	YF2116104JT	Carbon	100K ohms 1/16W
R9	YF2116223JT	Carbon	22K ohms 1/16W
R10	YF2116104JT	Carbon	100K ohms 1/16W
R11,12	YF2116103JT	Carbon	10K ohms 1/16W
R13	YF2116473GT	Carbon	47K ohms 1/16W
R14	YF2116163JT	Carbon	16K ohms 1/16W
R15	YF2116683GT	Carbon	68K ohms 1/16W
R16	YF2116103JT	Carbon	10K ohms 1/16W
R17	YF2116682JT	Carbon	6.8K ohms 1/16W
R18	YF2116563JT	Carbon	56K ohms 1/16W
R19	YF2116104JT	Carbon	100K ohms 1/16W
R20	YF2116334JT	Carbon	330K ohms 1/16W
R21	YF2116682JT	Carbon	6.8K ohms 1/16W
R22	YF2116332JT	Carbon	3.3K ohms 1/16W
R23	YF2116222GT	Carbon	2.2K ohms 1/16W
R24	YF2116472GT	Carbon	4.7K ohms 1/16W
R25,26	YF2116103JT	Carbon	10K ohms 1/16W
R27	YF2116123JT	Carbon	12K ohms 1/16W
R28	YF2116683GT	Carbon	68K ohms 1/16W
R29	YF2116563JT	Carbon	56K ohms 1/16W
R30	YF2116154JT	Carbon	150K ohms 1/16W
R31	YF2116103JT	Carbon	10K ohms 1/16W
R32	ERDS2TJ102	Carbon	1K ohms 1/4W
R33	ERDS2TJ181	Carbon	180 ohms 1/4W
R34,35	YF2116223JT	Carbon	22K ohms 1/16W
R36	YF2116392JT	Carbon	3.9K ohms 1/16W
R37	YF2116680JT	Carbon	68 ohms 1/16W
R38	YF2116330JT	Carbon	33 ohms 1/16W
R39	YF2116621JT	Carbon	620 ohms 1/16W
R40	YF2116124GT	Carbon	120K ohms 1/16W
R41	YF2116102GT	Carbon	1K ohms 1/16W
R43	YF2116304JT	Carbon	300K ohms 1/16W
R44	YF2116334JT	Carbon	330K ohms 1/16W
R45	YF2116332JT	Carbon	3.3K ohms 1/16W
R46	YF2116562JT	Carbon	5.6K ohms 1/16W
R47	YF2116104JT	Carbon	100K ohms 1/16W
R48	YF2116682JT	Carbon	6.8K ohms 1/16W
R49	YF2116102GT	Carbon	1K ohms 1/16W
R50	YF2116333GT	Carbon	33K ohms 1/16W
R51	YF2116682JT	Carbon	6.8K ohms 1/16W
R52	YF2116472GT	Carbon	4.7K ohms 1/16W
R53	YF2116332JT	Carbon	3.3K ohms 1/16W
R54	YF2116104JT	Carbon	100K ohms 1/16W
R55	ERDS2TJ100	Carbon	10 ohms 1/4W
R56	YF2116680JT	Carbon	68 ohms 1/16W
R57	YF2116273GT	Carbon	27K ohms 1/16W
R58	YF2116183GT	Carbon	18K ohms 1/16W
R61	YF2116680JT	Carbon	68 ohms 1/16W
R62	YF2116102GT	Carbon	1K ohms 1/16W
R63	YF2116223JT	Carbon	22K ohms 1/16W
R64	YF2116303GT	Carbon	30K ohms 1/16W
R65	YF2116153JT	Carbon	15K ohms 1/16W
R66	YF2116104JT	Carbon	100K ohms 1/16W
R67	YF2116102GT	Carbon	1K ohms 1/16W
R68	YF2116472GT	Carbon	4.7K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R69	YF2116332JT	Carbon	3.3K ohms 1/16W
R70	YF2116750JT	Carbon	75 ohms 1/16W
R71	YF2116152JT	Carbon	1.5K ohms 1/16W
R72	YF2116113JT	Carbon	11K ohms 1/16W
R73	YF2116821GT	Carbon	820 ohms 1/16W
R74	YF2116471JT	Carbon	470 ohms 1/16W
R75	YF2116123JT	Carbon	12K ohms 1/16W
R76,77	YF2116103JT	Carbon	10K ohms 1/16W
R78	YF2116102GT	Carbon	1K ohms 1/16W
R79-84	YFR1220P203D	Metal	20K ohms
R85	YWR1220P912D	Metal	9.2K ohms
R88	YWR1220P753D	Metal	75K ohms
R89,90	YWR1220P912D	Metal	9.1K ohms
R91	YWR1220P912D	Metal	9.1K ohms
R92	YWR1220P622D	Metal	6.2K ohms
	YF2116103JT	Carbon	10K ohms 1/16W
R93-96	YFR1220P203D	Metal	20K ohms
R97,98	YWR1220P912D	Metal	9.2K ohms
R99-104	YF2116103JT	Carbon	10K ohms 1/16W
R105	YF2116563JT	Carbon	56K ohms 1/16W
R106-108	YF2116103JT	Carbon	10K ohms 1/16W
R109	YF2116104JT	Carbon	100K ohms 1/16W
R110	YF2116103JT	Carbon	10K ohms 1/16W
R111	YF2116222GT	Carbon	2.2K ohms 1/16W
R112	YF2116123JT	Carbon	12K ohms 1/16W
R113	YF2116153JT	Carbon	15K ohms 1/16W
R114	YF2116183GT	Carbon	18K ohms 1/16W
R115	YF2116472GT	Carbon	4.7K ohms 1/16W
R116	YF2116152JT	Carbon	1.5K ohms 1/16W
R117,118	YF2116102GT	Carbon	1K ohms 1/16W
R119	YF2116680JT	Carbon	68 ohms 1/16W
R120	YF2116183GT	Carbon	18K ohms 1/16W
R121	YF2116472GT	Carbon	4.7K ohms 1/16W
R122	YF2116152JT	Carbon	1.5K ohms 1/16W
R123,124	YF2116102GT	Carbon	1K ohms 1/16W
R125	YF2116680JT	Carbon	68 ohms 1/16W
R126	YF2116183GT	Carbon	18K ohms 1/16W
R127	YF2116472GT	Carbon	4.7K ohms 1/16W
R128	YF2116152JT	Carbon	1.5K ohms 1/16W
R129,130	YF2116102GT	Carbon	1K ohms 1/16W
R131	YF2116680JT	Carbon	68 ohms 1/16W
R132,133	YF2116105GT	Carbon	1M ohms 1/16W
R134	YF2116103JT	Carbon	10K ohms 1/16W
R135	YF2116222GT	Carbon	2.2K ohms 1/16W
R136	YF2116102GT	Carbon	1K ohms 1/16W
R137	YF2116561JT	Carbon	560 ohms 1/16W
R138	YF2116331JT	Carbon	330 ohms 1/16W
R139	YF2116822JT	Carbon	8.2K ohms 1/16W
R140,141	YWR1220P202D	Metal	2K ohms
R142	YWR1220P303D	Metal	30K ohms
R143	YF2116103JT	Carbon	10K ohms 1/16W
R144,145	YWR1220P563D	Metal	56K ohms
R146	YWR1220P393D	Metal	39K ohms
R147	YF2116563JT	Carbon	56K ohms 1/16W
R148	YF2116561JT	Carbon	560 ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R149	YF2116332JT	Carbon	3.3K ohms 1/16W
R150	YF2116223JT	Carbon	22K ohms 1/16W
R151	YF2116103JT	Carbon	10K ohms 1/16W
R152,153	YF2116152JT	Carbon	1.5K ohms 1/16W
R154	YF2116472GT	Carbon	4.7K ohms 1/16W
R155,156	YF2116103JT	Carbon	10K ohms 1/16W
R157	YF2116152JT	Carbon	1.5K ohms 1/16W
R158	YF2116472GT	Carbon	4.7K ohms 1/16W
R159	YF2116680JT	Carbon	68 ohms 1/16W
R160	YF2116183GT	Carbon	18K ohms 1/16W
R161	YF2116472GT	Carbon	4.7K ohms 1/16W
R162	YF2116152JT	Carbon	1.5K ohms 1/16W
R163	YF2116102GT	Carbon	1K ohms 1/16W
R164	YF2116222GT	Carbon	2.2K ohms 1/16W
R166	YF2116203JT	Carbon	20K ohms 1/16W
R167,168	YF2116103JT	Carbon	10K ohms 1/16W
R169	YF2116183GT	Carbon	18K ohms 1/16W
R170	YF2116471JT	Carbon	470 ohms 1/16W
R171,172	YF2116103JT	Carbon	10K ohms 1/16W
R173	YF2116222GT	Carbon	2.2K ohms 1/16W
R174	YF2116152JT	Carbon	1.5K ohms 1/16W
R175	YF2116472GT	Carbon	4.7K ohms 1/16W
R176	YF2116683GT	Carbon	68K ohms 1/16W
R177	YF2116133GT	Carbon	13K ohms 1/16W
R178	YF2116272JT	Carbon	2.7K ohms 1/16W
R179	YF2116102GT	Carbon	1K ohms 1/16W
R180	YF2116681JT	Carbon	680 ohms 1/16W
R181	YF2116104JT	Carbon	100K ohms 1/16W
R182	YF2116154JT	Carbon	150K ohms 1/16W
R183,184	YF2116104JT	Carbon	100K ohms 1/16W
R185	ERDS2TJ100	Carbon	10 ohms 1/4W
R186	YF2116333GT	Carbon	33K ohms 1/16W
R187	YF2116222GT	Carbon	2.2K ohms 1/16W
R188,189	YF2116104JT	Carbon	100K ohms 1/16W
R190	YF2116102GT	Carbon	1K ohms 1/16W
VR1	YFH0621A3R3K	Variable Resistor	3.3K ohms
Z1	YFRKM10L104F	Block Resistor	
C1	ECEA1CK101	Electrolytic	100 µF 16V
C2	ECEA1CU470	Electrolytic	47 µF 16V
C3	ECEA1HKS010	Electrolytic	1 µF 50V
C4	ECEA1EK470	Electrolytic	47 µF 25V
C5	YF400104FZT	Ceramic	0.1 µF
C6	ECEA1CSN100	Electrolytic	10 µF 16V
C7	ECEA1CSS102	Electrolytic	1000 µF 16V
C8,9	ECEA1CU470	Electrolytic	47 µF 16V
C10	ECEA1HKS010	Electrolytic	1 µF 50V
C11	YF400101CHJT	Ceramic	100 pF
C12	ECEA1HKS010	Electrolytic	1 µF 50V
C14	ECEA1CU471	Electrolytic	470 µF 16V
C15	ECEA1AU470	Electrolytic	47 µF 10V
C16	ECEA1AKN470	Electrolytic	47 µF 10V
C17	ECEA1AU470	Electrolytic	47 µF 10V
C18	ECEA1CU222	Electrolytic	2200 µF 16V
C19	YF400103XKT	Ceramic	0.01 µF
C20	ECEA1AU470	Electrolytic	47 µF 10V

REF.NO.	PART NO.	DESCRIPTION	
C21	ECEA1CU470	Electrolytic	47 µF 16V
C22,23	ECEA1AU470	Electrolytic	47 µF 10V
C24	ECEA1CK101	Electrolytic	100 µF 16V
C25-30	ECQM1H104JZ	Plastic	0.1 µF 50V
C31-37	YF400103XKT	Ceramic	0.01 µF
C38	ECEA1CU470	Electrolytic	47 µF 16V
C39	ECEA1AU470	Electrolytic	47 µF 10V
C40	ECEA1HKS010	Electrolytic	1 µF 50V
C41-44	ECEA1CU470	Electrolytic	47 µF 16V
C45	ECEA1EK3R3	Electrolytic	3.3 µF 25V
C46	ECEA1HKS010	Electrolytic	1 µF 50V
C47	ECEA1AU470	Electrolytic	47 µF 10V
C48	YF400104FZT	Ceramic	0.1 µF
C50	ECEA1HKS010	Electrolytic	1 µF 50V
C51	ECEA1CU470	Electrolytic	47 µF 16V
C52	ECQM1H104JZ	Plastic	0.1 µF 50V
C53	YF400104FZT	Ceramic	0.1 µF
C54	ECEA1CU470	Electrolytic	47 µF 16V
C55	YF400104FZT	Ceramic	0.1 µF
C56	ECEA1CKS100	Electrolytic	10 µF 16V
C57	YF400151CHJT	Ceramic	150 pF
C58	YF400470CHJT	Ceramic	47 pF
C60-62	ECEA1CU470	Electrolytic	47 µF 16V
C63	ECEA1AKN470	Electrolytic	47 µF 10V
C64,65	ECEA1CKS100	Electrolytic	10 µF 16V
C66	YF400222XKT	Ceramic	2200 pF
C67	ECEA1ASS101	Electrolytic	100 µF 10V
C68	ECEA1ESN3R3	Electrolytic	3.3 µF 25V (SN)
C70	ECKF1H331KB	Ceramic	330 pF 50V
SW1	YWSSS322	Slide Switch	
X1	YFCSB500EG	Crystal Oscillator	
F1-3	YWSSFR3A	Current Fuse	
J42	YF21160R00T	Jumper Resistor	
CN1-JM	EMCS0350Z	3 pin Jack Male	
CN2-JM	EMCS0550Z	5 pin Jack Male	
CN3-JM	EMCS1250Z	12 pin Jack Male	
CN4-JM	EMCS1150Z	11 pin Jack Male	
CN5-JM	EMCS1050Z	10 pin Jack Male	
CN6-JM	EMCS0750Z	7 pin Jack Male	
CN8-JM	EMCS0550Z	5 pin Jack Male	
CN9-JM	EMCS0250Z	2 pin Jack Male	
CN10-JM	EMCS0850Z	8 pin Jack Male	
CN11-JM	EMCS0250Z	2 pin Jack Male	
CN12-JM	EMCS0250Z	2 pin Jack Male	
CN13-JM	EMCS1050Z	10 pin Jack Male	
CN14-JM	EMCS0250Z	2 pin Jack Male	
CN15-JM	EMCS0350Z	3 pin Jack Male	
CN16-JM	EMCS0350Z	3 pin Jack Male	
CN17-JM	EMCS0550Z	5 pin Jack Male	
CN18-JM	EMCS0650Z	6 pin Jack Male	
CN19-JM	EMCS0750Z	7 pin Jack Male	
CN20-JM	EMCS0250Z	2 pin Jack Male	
CN21-JM	EMCS0250Z	2 pin Jack Male	

REF.NO.	PART NO.	DESCRIPTION	
CN22-JM	EMCS0550Z	5 pin Jack Male	
CN23-JM	EMCS0650Z	6 pin Jack Male	
CN24-JM	EMCS0250Z	2 pin Jack Male	
TP1,2	YW32BM7R5	Test Pin	

50 PIN CONNECTION BOARD

PCB2	o YWVRZAD42P2B	Printed Board	
CN1	o YWXC5B5021	50 pin Connector	

SWITCH BOARD

PCB3	o YWVRZAD42P3B	Printed Board	
SW1,2	YFSSS222A	Slide Switch	
SW3	YFSSS223A	Slide Switch	
SW4	YFSSS222A	Slide Switch	

MIC BOARD

PCB4	o YWVRZAD42P4A	Printed Board	
C1	ECKF1E104ZV	Ceramic	0.1 µF
CN5	o YWRAMSA331	MIC Connector	

VR BOARD

PCB5	o YWVRZAD42P5A	Printed Board	
R1	ERDS2FJ331	Carbon	330 ohms 1/8W
R2	ERDS2TJ753	Carbon	75K ohms 1/8W
VR1	EVJVGAE05B23	Variable Resistor	2K ohms

TALLY BOARD

PCB6	o YWVRZAD42P6A	Printed Board	
D1	LN21RPHL	LED	

EARTH CONNECTION BOARD

PCB7	o YWVRZAD42P7A	Printed Board	

ACCESSORY PARTS/PACKAGING PARTS

M95	o YWV8QA1556AN	Operating Instructions	
M96	XZB26X40C05	Polyethylene Bag	
M97	XZB45X63C05	Polyethylene Bag	
M98	o YWV9CB1059AN	Packaging	

1.5" ELECTRONIC VIEWFINDER WV-VF38

MISCELLANEOUS

REF.NO.	PART NO.	DESCRIPTION
V1 ⚠	o C1M33P4	Cathode Ray Tube
L6 ⚠	o YWELY15V204A	Deflction Coil
CN1	o YWEB202J604	EVF Cable Assy
CN6	o YWS7518N614	CRT Socket
M1	o YWV5EA0430B1	EVF Bottm Cover
M2	o YWV2TA0087A4	Mounting Bracket for Shoe
M3	o YWV4RA0020A4	Lock Lever
M4	o YWV4JA0151A4	Spring for Lock Lever
M5	o YWV2EA0053A4	Guide A for Shoe
M6	o YWV2EA0054A4	Guide B for Shoe
M7	o YWV2FA0151A4	Cushion for LED
M8	YFNA326PB-9	Panasonic Badge
M9	o YWV5EA0429B1	EVF Upper Cover
M10	YFV5MA0002B4	Shoe
M11	YWCC704WM07	Spring for Shoe
M12	YFV1FA0010A4	Stopper Nut
M13	YWV4JA0149A4	Turming Spring for CRT Cover
M14	o YWV5EA0432B1	CRT Bottm Cover
M15	YWV1UA0012A4	Mirror
M17,18	YFV2FA0049B4	Cushion for CRT (X2)
M19	YWV2VA0010B4	Barrier
M20	YFV2FA0053A4	Cushion
M21	YWV5EA0431A1	CRT Upper Cover
M22	YWV4JA0150B4	Spring
M23	YWV9BA0007DN	Optical Ass'y
M27	o YWV5GA0051A3	Eye Cap
M28	o YFV2FA0014B4	Neck Rubber Cushion for CRT
M29	YWCC704FM02	Special Screw for Shoe
M31 ⚠	o YWV7QA1371B4	Main Label
M32	YWS-WULRB03	Caution Label
M33	YWV7MA0279A4	Serviceman Caution Label
M34	YWS-XEGRB03A	Safety Label
M35	YFV7MA0099A4	Safety Label
M38	YWV6FA0064A2	EVF Bracket
M39	o YWV1KA0040A4	Washer for Lock Knob
M40	o YWV5RA0077A4	Lock Knob
M41	o YWV1EA0074A4	Special Screw
M42	o YWV1KA0039A4	Washer
M43	o YWV4JA0148A4	Spring for Unit Stopper
M44	o YWV6GA0057A4	Guid Rail
M45	o YWV4RA0019A4	Unit Stopper
M46	o YWV2JA0014A4	Lock Knob Shaft

MAIN BOARD

REF.NO.	PART NO.	DESCRIPTION	
PCB1 (NLA)	o YWVKBVF38E1A	Printed Circuit Board Assy	
IC1	M5231L	IC	
IC2	BA7125L	IC	
Q1	2SB793-RS	Transistor	
Q2	2SD601-RS	Transistor	
Q4	2SB709-Q	Transistor	
Q5	2SA1174-FE	Transistor	
Q6	2SD601-RS	Transistor	
Q7	2SC2784-FE	Transistor	
Q8	2SD601-RS	Transistor	
Q11	2SD1271A-P	Transistor	
D3	MA151K	Diode	
R1	YF2116331JT	Carbon	330 ohms 1/16W
R2	YF2116561JT	Carbon	560 ohms 1/16W
R3	YF2116103JT	Carbon	10K ohms 1/16W
R4	YF2116272JT	Carbon	2.7K ohms 1/16W
R5	YF2116163JT	Carbon	16K ohms 1/16W
R6	YF2116333GT	Carbon	33K ohms 1/16W
R7	YF2116102GT	Carbon	1K ohms 1/16W
R8	YF2116202JT	Carbon	2K ohms 1/16W
R11	YF2116123JT	Carbon	12K ohms 1/16W
R12	YF2116623JT	Carbon	62K ohms 1/16W
R13	YF2116242GT	Carbon	2.4K ohms 1/16W
R14	YF2116220JT	Carbon	22 ohms 1/16W
R15	YF2116102GT	Carbon	1K ohms 1/16W
R16	YF2116104JT	Carbon	100K ohms 1/16W
R17	YF2116513JT	Carbon	51K ohms 1/16W
R18	YW2116360GT	Carbon	36 ohms 1/16W
R19	YF2116330JT	Carbon	33 ohms 1/16W
R20	YF2116821GT	Carbon	820 ohms 1/16W
R21	YF2116103JT	Carbon	10K ohms 1/16W
R22	YF2116273GT	Carbon	27K ohms 1/16W
R23	YF2116681JT	Carbon	680 ohms 1/16W
R24	YF2116152JT	Carbon	1.5K ohms 1/16W
R25	YF2116822JT	Carbon	8.2K ohms 1/16W
R26	YF2116221JT	Carbon	220 ohms 1/16W
R27	ERDS2TJ102	Carbon	1K ohms 1/4W
R28	ERDS2TJ103	Carbon	10K ohms 1/4W
R29	YF2116105GT	Carbon	1M ohms 1/16W
R30	YF2116104JT	Carbon	100K ohms 1/16W
R31	YF2116122JT	Carbon	1.2K ohms 1/16W
R32	YF2116153JT	Carbon	15K ohms 1/16W
R33	YF2116332JT	Carbon	3.3K ohms 1/16W
R34	YF2116104JT	Carbon	100K ohms 1/16W
R35	ERDS2TJ333	Carbon	33K ohms 1/4W
R39	YF2116103JT	Carbon	10K ohms 1/16W
R40	YF2116222GT	Carbon	2.2K ohms 1/16W
R41	YF2116562JT	Carbon	5.6K ohms 1/16W
R52,53	YF2116102GT	Carbon	1K ohms 1/16W
R55	ER025CKF1004	Metal	1M ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION
R56,57	ER050CKF1304	Metal 1.3M ohms 1/16W
R58	ER025CKF1004	Metal 1M ohms 1/4W
R59	ER025CKF3903	Metal 90K ohms 1/4W
VR1	EVM8AGA00B13	Variable Resistor 1K ohms
VR2	RK09KA001KB	Variable Resistor 1K ohms
VR3	YFH0621A10K	Variable Resistor 10K ohms
VR4	EVM8AGA00B12	Variable Resistor 100 ohms
VR5	RK09KA100KB	Variable Resistor 100K ohms
VR7	PK502H204H0A	Variable Resistor 200K ohms
VR8	PK502H105H0A	Variable Resistor 1M ohms
C1	ECEA1CK101	Electrolytic 100 µF 16V
C2	YF400102XKT	Ceramic 1000 pF
C3	ECEA1HKS010	Electrolytic 1 µF 50V
C4	ECEA1ASS101	Electrolytic 100 µF 10V
C5	ECEA1AKN470	Electrolytic 47 µF 10V
C6	ECEA0JKS101	Electrolytic 100 µF 6.3V
C8	YW400471UJJT	Ceramic 470 pF
C9	ECEA1HK010	Electrolytic 1 µF 50V
C10	YF400223XKT	Ceramic 0.022 µF
C11	ECEA1HKS010	Electrolytic 1 µF 50V
C12	YF400472XKT	Ceramic 4700pF
C13	ECEA1EK100	Electrolytic 10 µF 10V
C14	YF400332XKT	Ceramic 3300 pF
C15	ECSF1VE334	Electrolytic 0.33 µF 35V
C16	ECEA1AFS101	Electrolytic 100 µF 10V
C18	YF400103XKT	Ceramic 0.01 µF
C19	ECEA1HKS2R2	Electrolytic 2.2 µF 50V
C20,21	YF426102CHJS	Ceramic 1000 pF 50V
C22	YF400201CHJT	Ceramic 200 pF
C23	ECEA0JKS101	Electrolytic 100 µF 6.3V
C24	ECEA0JKA470	Electrolytic 47 µF 6.3V (KA)
C25	ECEA1AS470	Electrolytic 47 µF 10V
C26	ECEA1AKS330	Electrolytic 33 µF 10V
C27	YF400150CHJT	Ceramic 15 pF
C28	YW400620CHJT	Ceramic 62 pF
C29	ECQE1104KZ	Plastic 0.1 µF 100V
C30	YF400390CHJT	Ceramic 39 pF
C31	YF400101CHJT	Ceramic 100 pF
C38	ECEA1AFS101	Electrolytic 100 µF 10V
C39	ECEA1ASS101	Electrolytic 100 µF 10V
C40	ECEA1EK100	Electrolytic 10 µF 10V
C41	ECQP1182JZ	Plastic 1800pF 100V
C43	ECEA1AFS101	Electrolytic 100 µF 10V
C44	ECEA1ASS101	Electrolytic 100 µF 10V
C45	ECEA2AU100	Electrolytic 10 µF 200V
C48	ECQE6103JZ	Plastic 0.01 µF 600V
C49	ECQE4103JZ	Plastic 0.01 µF 400V
C57	YF400333XKT	Ceramic 0.033 µF
L3	ELC08D056	Coil 100 µH
L4	EIR1QE033B	Coil 350 µH
L5	ELH5L314	Coil 230 µH
T1 ⚠	YWHIPAKVF38	Flyback Transformer
J9	ERDS2TC0	Jamper Resister
J10	YF21160R00T	Jamper Resister

REF.NO.	PART NO.	DESCRIPTION
CN1-JM	EMCS0550Z	5 pin Jack Male
CN4-JM	EMCS0450Z	4 pin Jack Male
CN6	S7518N614	Coil Socket
TP1-7	YW32BM7R5	Test pin

SWITCH BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB2 (NLA)	o YWVKCVF38E1A	Printed Circuit Board Assy
Q12-14	2SB709-Q	Transistor
Q15	2SD601-RS	Transistor
Q16,17	2SD1478-QR	Transistor
D7-10	YWGL5HD22	Diode
R60	YF2116752GT	Carbon 7.5K ohms 1/16W
R61	YF2116242GT	Carbon 2.4K ohms 1/16W
R62	ERDS2TJ752	Carbon 7.5K ohms 1/4W
R63	YF2116752GT	Carbon 7.5K ohms 1/16W
R64	YF2116242GT	Carbon 2.4K ohms 1/16W
R65	ERDS2TJ113	Carbon 11K ohms 1/4W
R66	YF2116752GT	Carbon 7.5K ohms 1/16W
R67	YF2116242GT	Carbon 2.4K ohms 1/16W
R68	ERDS2TJ432	Carbon 4.3K ohms 1/4W
R69	YF2116752GT	Carbon 7.5K ohms 1/16W
R70	YF2116242GT	Carbon 2.4K ohms 1/16W
R71	ERDS2TJ512	Carbon 5.1K ohms 1/4W
R72	YF2116333GT	Carbon 33K ohms 1/16W
R73	YF2116104GT	Carbon 100K ohms 1/16W
R74	ERDS2TJ512	Carbon 5.1K ohms 1/4W
R75	YF2116333GT	Carbon 33K ohms 1/16W
R76	YF2116104GT	Carbon 100K ohms 1/16W
R77	ERDS2FJ101	Carbon 100 ohms 1/4W
C50	ECEA1CK101	Electrolytic 100 µF 16V
C51-56	YF400104FZT	Ceramic 0.1 µF
SW1,2	YWMEV7101G-8	Toggle Switch
CN2-JM	EMCS0550Z	5 pin Jack Male
CN3-JM	EMCS0450Z	4 pin Jack Male
CN5-JM	EMCS0750Z	7 pin Jack Male

VIC BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB3 (NLA)	o YWVKDVF38E1A	Printed Circuit Board Assy
IC3	MN4538BS	IC
Q9	2SB709-RS	Transistor
Q10	2SD601-RS	Transistor
R42	YF2116752GT	Carbon 7.5K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION
R43	YF2116104GT	Carbon 100K ohms 1/16W
R44	YF2116562GT	Carbon 5.6K ohms 1/16W
R45	YF2116103GT	Carbon 10K ohms 1/16W
R46	YF2116182GT	Carbon 1.8K ohms 1/16W
R47	YF2116103GT	Carbon 10K ohms 1/16W
R48	YF2116472GT	Carbon 4.7K ohms 1/16W
R49	YF2116103GT	Carbon 10K ohms 1/16W
R50	YW2116684GT	Carbon 680K ohms 1/16W
R51	YF2116562GT	Carbon 5.6K ohms 1/16W
VR6	YWH0622A470K	Variable Resistor 470K ohms
C34,35	ECEA1EK100	Electrolytic 10 µF 10V
C36	YF400472XKT	Ceramic 4700 pF
C37	YF426102CHJS	Ceramic 1000 pF 50V
CN7-JM	YFIH10205	5 pin Jack Male

LED BOARD

PCB4	o YWVRZVF38P1A	Printed Board
D11	SLM13VW	LED
D12	SLM13MW	LED
D13	SLM13DW	LED
D14	SLM23VMW	LED
M16	YWV7QB1244A4	LED Panel

ACCESSORY PARTS/PACKAGING PARTS

M50	o YWV8QA1381AN	Operating Instructions
M54	XZB20X25C03	Polyethylene Bag
M55	o YWV9CA1015AN	Packaging
M56	YWV8FA0140A4	Packing Label

12X SERVO CONTROL ZOOM LENS J12X10BKRSM

MISCELLANEOUS

MO1	o YWBH20164000	DC Motor A
MO2	o YWVH20353000	DC Motor B
VR101	o YWBH12106000	Variable Resistor
VR102	o YWBH12056020	Variable Resistor
SW1	o YWSSB022	Slide Switch

REF.NO.	PART NO.	DESCRIPTION
SW2,3	o YWB3F-1000	Push Switch
SW4	o YWSP1103F	Push Switch
CN1	o YWBH70467000	Connector Plug
CN2	o YF03R8F3	Connector Receptacle
M1	o YWBA19296020	Hood Cap
M2	o YWBC06962000	Hood
M3	o YWBC06962000	Hood Knob
M4	o YW241019000	Lens Cap
M5	o YWBC07438000	Zoom Lever
M6	o YWBS33522000	Dust Cap
M7	o YWBG0-5301	Zoom Lens Assy
M10	o YWBC07677040	Main Cover
M11	o YWY621092000	Grip Band
M12	o YWBC06964020	Switch Cover
M13	o YWBC06963030	Switch Cover
M14	o YWBC06969000	Sheet
M15	o YWBC06965000	Slide Switch Cap
M16	o YWBC08679000	Rubber
M17	o YWBC07690020	Trimmer Cap
M18	o YWBC08316000	Name Plate
M20	o YWBC07676040	Body
M21	o YWBC07672040	Switch Plate
M22	o YWBC07678020	Holder A
M23	o YWBC08570000	Holder B
M24	o YWBC06966020	Cable Cover
M25	o YWBC05936000	Connector Cap
M26	o YWBC07691020	Holder C
M27	o YWBC06967000	Cable Clamp
M28	o YWBC07685030	Holder D
M29	o YWBC07686020	Rubber
M30	o YWBC07674000	Iris Motor Rubber
M31	o YWBC07687040	Holder E
M32	o YWBC07665020	Iris Motor Shaft
M33	o YWBA23366000	Washer A
M35	o YWBC07666000	Washer B (X3)
M36	o YWBC07683020A	Spring A
	o YWBC07683020B	Spring A
M37	o YWBA23043000	Gear A
M38	o YWBC07668000	Gear B
M39	o YWBC07679020	Shaft A
M40	o YWBC07667020	Iris Pot Gear
M42	o YWBC08707000	Washer C(X2)
M43	o YWBC07671000	Gear C
M44	o YWBC08844000	Washer D
M45	o YWBA23687000	Wave Washer
M46	o YWBC06968000	E Ring
M47	o YWBC07680000	Shaft B
M50	o YWBA23686000	Washer E
M51	o YWBC07689030	Shaft C
M52	o YWBC0768202A or	Spring B
	o YWBC0768202B	Spring B
M54	o YWBA22639000	Washer F
M55	o YWBA22638000	Washer G
M56	o YWBA2304000	Gear D

REF.NO.	PART NO.	DESCRIPTION
M57	o YWBC07670020	Zoom Motor Shaft
M58	o YWBC07688040	Holder
M59	o YWBC08809000	Rubber
M60	o YWBA20255020	Clutch
M61	o YWBC07693000	Clutch Spring
M62	o YWBA20254020	Clutch Knob Stopper
M63	o YWBF51362000	Clutch Cam
M64	o YWBA20464000	Stop Screw

DRIVE BOARD

REF.NO.	PART NO.	DESCRIPTION	
PCB1 (NLA)	o YWBG21690000	Printed Circuit Board Assy	
IC1	YWUPC1060-C	IC	
IC2,3	NJM2902M	IC	
IC4	NJM2904M	IC	
IC5	NJM4556M	IC	
IC6	NJM2902M	IC	
Q1,2	2SC2712-Y	Transistor	
Q3	2SK209-GR	FET	
Q4	2SC3295-B	Transistor	
Q5,6	2SC2884-Y	Transistor	
Q7	2SA1204-Y	Transistor	
Q8	2SC2884-Y	Transistor	
Q9	2SA1204-Y	Transistor	
D1	YW1SS187	Diode	
D3	YW1S2835	Diode Alley	
D4,5	YW1S2837	Diode Alley	
D6	YW1S2835	Diode Alley	
D7	YW1SS187	Diode	
D9	1SS123	Diode Alley	
R1	YWMCR10242J	Carbon	2.4k ohms 1/10W
R2-5	YWMCR10103J	Carbon	10k ohms 1/10W
R6	YWMCR10203F	Carbon	20k ohms 1/10W
R7	YWMCR10123F	Carbon	12k ohms 1/10W
R8-10	YWMCR10103F	Carbon	10k ohms 1/10W
R12	YWMCR10102J	Carbon	1k ohms 1/10W
R13	YWMCR10163J	Carbon	16k ohms 1/10W
R14	YWMCR10624J	Carbon	620k ohms 1/10W
R15	YWMCR10105J	Carbon	1M ohms 1/10W
R16	YWMCR10394J	Carbon	390k ohms 1/10W
R17	YWMCR10101J	Carbon	100 ohms 1/10W
R18	YWMCR10473J	Carbon	47k ohms 1/10W
R19	YWMCR10303J	Carbon	30k ohms 1/10W
R20	YWMCR10105J	Carbon	1M ohms 1/10W
R21	YWMCR10203J	Carbon	20k ohms 1/10W
R22	YWMCR10473J	Carbon	47k ohms 1/10W
R23	YWMCR10303J	Carbon	30k ohms 1/10W
R24	YWMCR10105J	Carbon	1M ohms 1/10W
R25	YWMCR10203J	Carbon	20k ohms 1/10W
R26-29	YWMCR10104F	Carbon	100k ohms 1/10W
R30	YWMCR10203J	Carbon	20k ohms 1/10W
R31	YWMCR10104J	Carbon	100k ohms 1/10W
R32	YWMCR10473J	Carbon	47k ohms 1/10W
R33-35	YWMCR10104J	Carbon	100k ohms 1/10W
R36	YWMCR10473J	Carbon	47k ohms 1/10W
R39,40	YWMCR10103J	Carbon	10k ohms 1/10W
R41	YWMCR10223J	Carbon	22k ohms 1/10W
R42	YWMCR10563J	Carbon	56k ohms 1/10W
R43	YWMCR10183J	Carbon	18k ohms 1/10W
R44,45	YWMCR10103J	Carbon	10k ohms 1/10W
R46,47	YWMCR10100J	Carbon	10 ohms 1/10W
R48-50	YWMCR10104J	Carbon	100k ohms 1/10W
R51,52	YWMCR10203J	Carbon	20k ohms 1/10W
R53	YWMCR10564J	Carbon	560k ohms 1/10W
R54	YWMCR10512J	Carbon	5.1k ohms 1/10W
R55	YWMCR10223J	Carbon	22k ohms 1/10W
R56	YWMCR10273J	Carbon	27k ohms 1/10W
R57-59	YWMCR10102J	Carbon	1k ohms 1/10W
R60	YWVR55420759	Carbon	7.5 ohms 1/5W
R61	YWMCR10391J	Carbon	390 ohms 1/10W
R62	YWMCR10162J	Carbon	1.6k ohms 1/10W
R63	YWMCR10399J	Carbon	3.9 ohms 1/10W
R64	YWMCR10223J	Carbon	22k ohms 1/10W
R65	YWMCR10473J	Carbon	47k ohms 1/10W
R66	YWMCR10223J	Carbon	22k ohms 1/10W
R67	YWMCR10473J	Carbon	47k ohms 1/10W
R68	YWMCR10103J	Carbon	10k ohms 1/10W
R69	YWMCR10472J	Carbon	4.7k ohms 1/10W
R75	YWMCR10103J	Carbon	10k ohms 1/10W
VR1	YWGF06S204	Variable Resistor	200k ohms
VR2,3	YWGF06S103	Variable Resistor	10k ohms
VR6,7	YWGF06P502	Variable Resistor	5k ohms
VR8	YWGF06P203	Variable Resistor	20k ohms
C1	YWVC52590330	Electrolytic	33 µF
C2	GR426B104M25	Ceramic	0.1 µF 50V
C3-5	YWVC50060106	Tantalum	10 µF
C7	GR426B104M25	Ceramic	0.1 µF 25V
C8,9	YF400103FZT	Ceramic	0.01 µF 25V
C10	GR426B104M25	Ceramic	0.1 µF 25V
C11	YF400101SLKT	Ceramic	100 pF 25V
C12	YWBH14176000	BP	1 µF 50V
C13,14	GR426B104M25	Ceramic	0.1 µF 25V
C15	YF426224FZ	Ceramic	0.22 µF 25V
C16	YF400101SLKT	Ceramic	100 pF 25V
C17	GR426B104M25	Ceramic	0.1 µF 25V
C18-22	YF400103FZT	Ceramic	0.01 µF 25V
RL1	YWLAD1	Lead Relay	12V
L1-4	YWFL5H221K	Choke Coil	
J37	YWMCR10000	Jamper Resistor	
J71,72	YWMCR10000	Jamper Resistor	
CP1-3	YWBH36176000	Check Terminal (Black)	
CP4-8	YWBH36174000	Check Terminal	
CP9	YWBH36172000	Check Termina	

ACCESSORY PARTS/PACKAGING PARTS

REF.NO.	PART NO.	DESCRIPTION
M71	o YWV8QA1248AN	Operating Instructions
M72	VQA0120-5	Warranty Card
M73	YWS-EULRB01	Service Center List
M75	YWV9CA1000AN	Packaging
M76	YWV8FA0137AN	Packing Label

TRIPOD MOUNTING ADAPTOR WV-Q47

MISCELLANEOUS

REF.NO.	PART NO.	DESCRIPTION
M1	YFV6GA0035B2	Base Plate
M2	YFV2NA0062A4	Lock Spacer
M3	YFV4SA0003A4	Roller
M4	YFV4HA0009A4	Lock Shaft
M5	YFV4JA0114A4	Spring
M6	YFV2NA0063A4	Spacer for Lock Lever
M7	YFV4RA0013A3	Lock Lever
M8	YFV4HA0008B4	Shaft for Lever
M9	YFV6FA0045A3	Lock Bracket
M10	YFV4JA0111A4	Coil Springfor Lock
M11	o YFV1EA0052A4	Special Screw
M12	YFV4SA0002A4	Roller
M13	YFV4JA0112A4	Spring
M14	YFV4JA0113A4	Spring
M15	o YWV7QA1298A4	Main Label
M16	o YWV2CA0150A2	Hold Plate for Nuts
M17	YFV6FA0046A4	Mounting Bracket
M18	YFV1FA0023A4	Slied Nuts

ACCESSORY PARTS/PACKAGING PARTS

REF.NO.	PART NO.	DESCRIPTION
M21	o YWV8QA1241AN	Operating Instructions
M22	XZB26X40C05	Polyethylene Bag
M23	o YWV9CB0744AN	Packaging
M24	YWS-RB032	Packing Label

MICROPHONE WV-MC35

MISCELLANEOUS

REF.NO.	PART NO.	DESCRIPTION
MIC1	o WM-55SAM	Mic Unit
E1	YPM-MS050EA4	Terminal +
E2	YPM-MX052AA4	Terminal –
CN1	o YWMLKA0298A4	MIC Cable Assy
M1	YPM-MS093BA	Earth Terminal
M3	YWM2LA0067A4	Joint
M4	o YPM-MC280IA	Chassis
M5	o YPMMC764AB4	Pipe
M6	o YWM9AA0418A4	Mechanical Ass'y
M7	YPM-HK463BA4	Battery Label
M8	o YPMHK565AF4	Main Label
M9	YPM-MH108AA	Cord Protector
M12	YWM6CA0061A4	Wind Screen

MIC BOARD

REF.NO.	PART NO.	DESCRIPTION	
PCB1	o YPM-EP218BA4	Printed Board	
R1	ERDS2TJ222	Carbon	2.2K ohms 1/8W
C1	ECEA1CU100	Electrolytic	10 µF 16V (SU)

ACCESSORY PARTS/PACKAGING PARTS

REF.NO.	PART NO.	DESCRIPTION
M15	o YPM-PN766AS	Packaging
M16	o YFV8FA0137A4	Packing Label

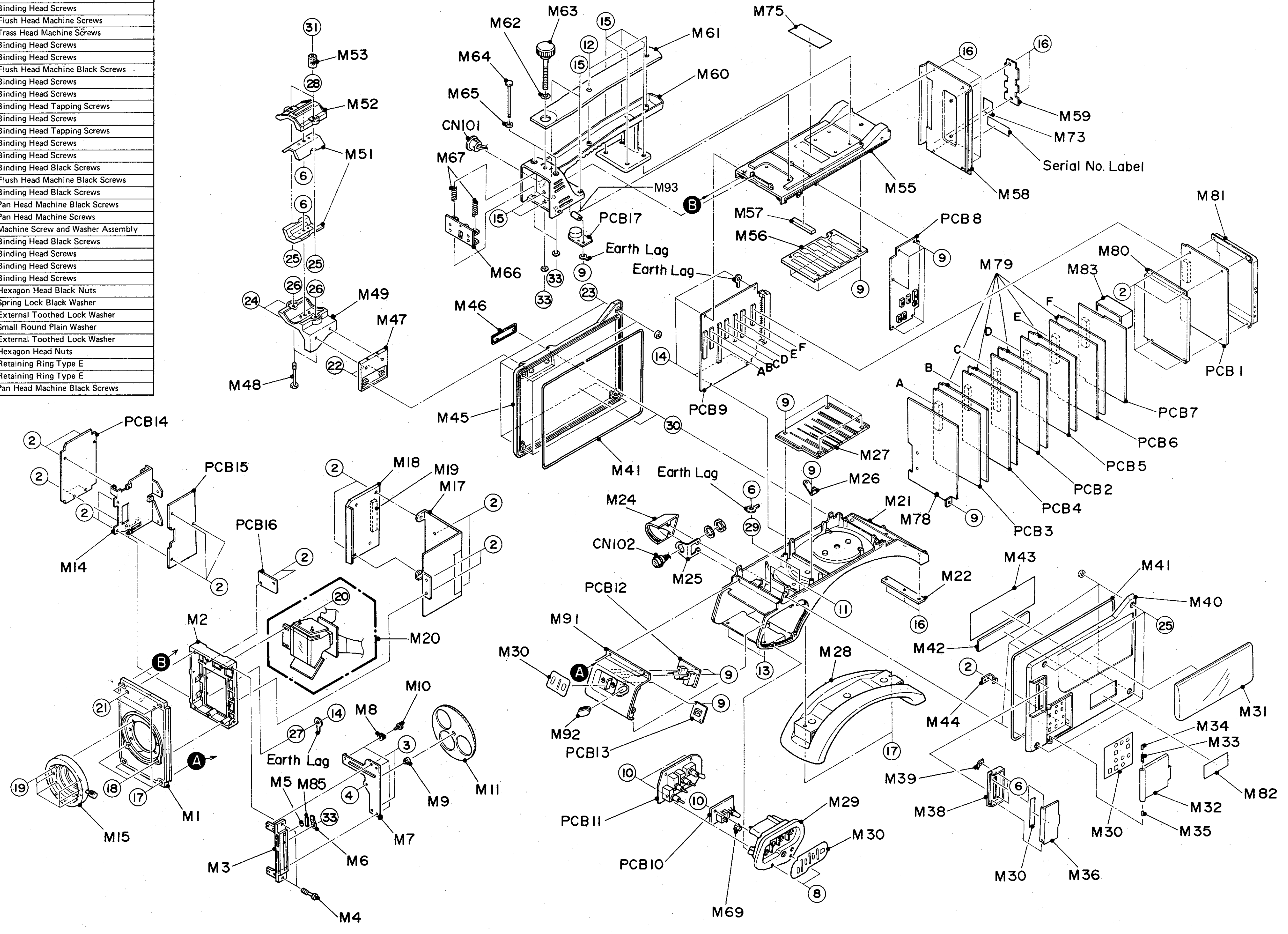
ACCESSORY PARTS/PACKAGING PARTS for WV-F200

REF.NO.	PART NO.	DESCRIPTION
M16	WN-0003	Mount Cap
M100	o YWV8QA1556AN	Operating Instructions
M104	XZB26X40C05	Polyethylene Bag for Lens and Printed
M105	YWT10X35C05	Polyethylene Bag for MIC
M106	YWT20X25C05	Polyethylene Bag for 1.5'EVF
M107	YWT20X35C05	Polyethylene Bag for Battey Pack
M108	XZB55X71C1	Polyethylene Bag for Camera
M109	YWT80X90X1	Polyethylene Bag for Carrying Case
M111	o YWV9CC1110AN	Packaging

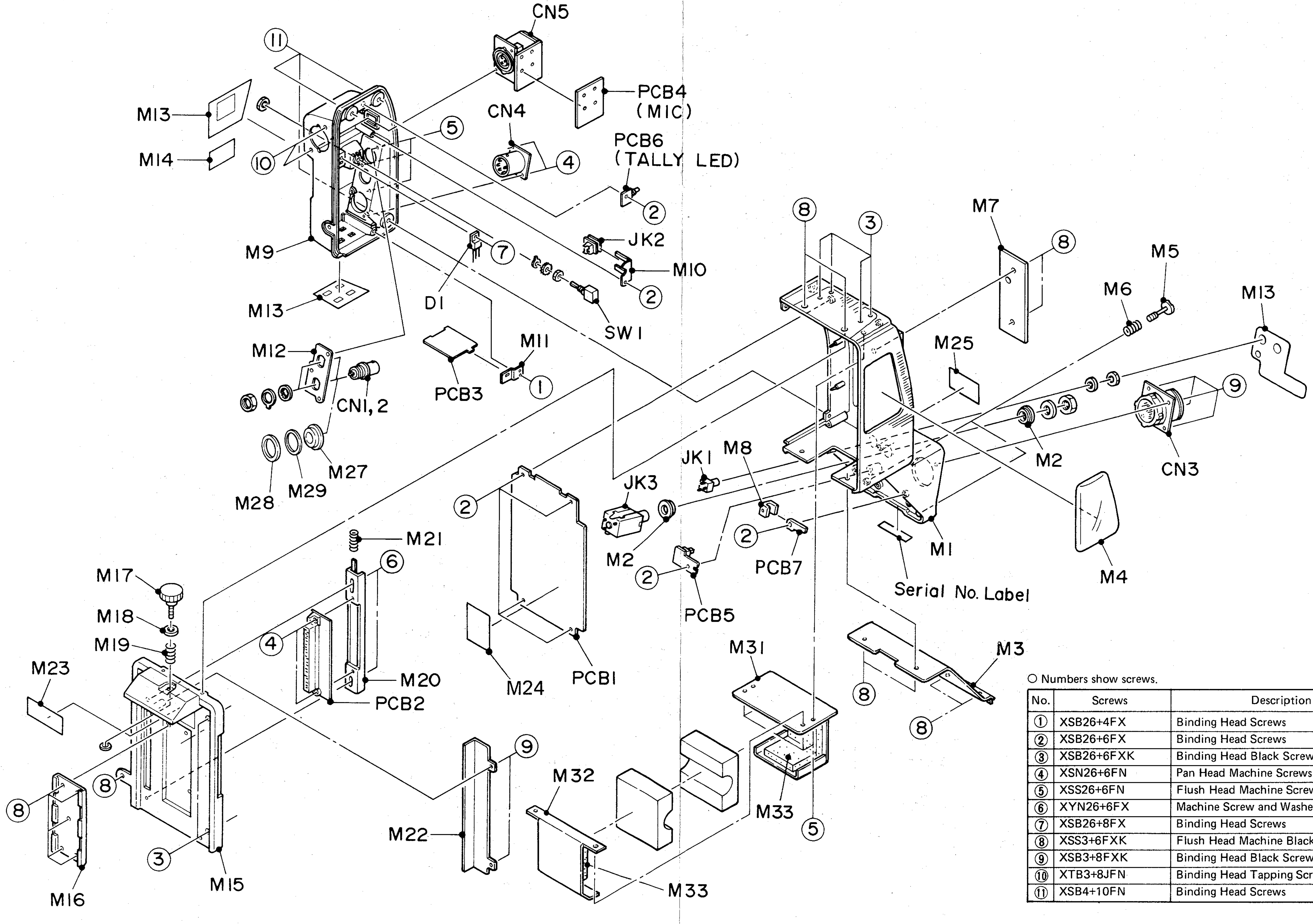
EXPLODED VIEW OF CAMERA

○ Numbers show Screws.

No.	Screws	Description
①	XSN2+3FXK	Pan Head Machine Black Screws
②	XSB2+4FX	Binding Head Screws
③	XSS2+4FX	Flush Head Machine Screws
④	XST2+4FX	Trass Head Machine Screws
⑤	XSB26+4FX	Binding Head Screws
⑥	XSB26+5FN	Binding Head Screws
⑦	XSS26+5FXK	Flush Head Machine Black Screws
⑧	XSB26+6FN	Binding Head Screws
⑨	XSB26+6FX	Binding Head Screws
⑩	XTB26+6GFX	Binding Head Tapping Screws
⑪	XSB26+8FX	Binding Head Screws
⑫	XSB26+8FXK	Binding Head Tapping Screws
⑬	XSB3+6FN	Binding Head Screws
⑭	XSB3+6FX	Binding Head Screws
⑮	XSB3+6FXK	Binding Head Black Screws
⑯	XSS3+6FXK	Flush Head Machine Black Screws
⑰	XSB3+8FXK	Binding Head Black Screws
⑱	XSN3+8FK	Pan Head Machine Black Screws
⑲	XSN3+8FN	Pan Head Machine Screws
⑳	XYN3+C8FX	Machine Screw and Washer Assembly
㉑	XSB3+10FXK	Binding Head Black Screws
㉒	XSB4+8FN	Binding Head Screws
㉓	XSB4+10FN	Binding Head Screws
㉔	XSB4+14FN	Binding Head Screws
㉕	XNG4CFXK	Hexagon Head Black Nuts
㉖	XWA4BFXK	Spring Lock Black Washer
㉗	XWC3BFX	External Toothed Lock Washer
㉘	XWE4FN	Small Round Plain Washer
㉙	XWC26BFN	External Toothed Lock Washer
㉚	XNG2EFX	Hexagon Head Nuts
㉛	XUC24FX	Retaining Ring Type E
㉜	XUC3FX	Retaining Ring Type E
㉝	XQN2A+3BXK	Pan Head Machine Black Screws


㉛
M53
㉘
M52
M51
⑥
⑥
㉕
㉕
㉖
㉖
㉔
M49
M47
㉒
M48
M62
M63
⑮
⑫
⑮
M61
M64
M65
M60
CN101
M67
M93
⑮
M66
PCB17
Earth Lag
㉝
㉝
⑨
M75
⑯
⑯
M59
M73
Serial No. Label
M55
M58
B
M57
M56
⑨
Earth Lag
PCB8
⑨
M81
M46
㉓
M45
⑭
A
B
C
D
E
F
PCB9
M41
㉚
M79
M80
M83
②
F
E
D
C
B
A
PCB1
PCB7
PCB6
PCB5
PCB2
PCB4
PCB3
⑨
M27
⑨
M26
Earth Lag
⑥
㉙
M24
CN102
M25
M21
M78
⑨
PCB14
②
②
②
②
M14
PCB15
PCB16
②
M18
M19
M17
②
②
②
⑳
M20
M2
B
㉑
⑲
⑱
⑰
M1
M15
A
Earth Lag
㉗
⑭
M8
M10
③
④
M5
M85
㉝
M6
M7
M9
M11
M3
M4
PCB12
M91
M30
A
⑨
⑨
M92
PCB13
⑪
⑬
M22
⑯
M43
M42
M41
M40
㉕
M28
M44
②
M31
M34
M33
M82
M39
⑥
M38
M30
M36
M30
M32
M35
⑰
⑩
⑩
PCB11
PCB10
M29
M30
⑧
M69

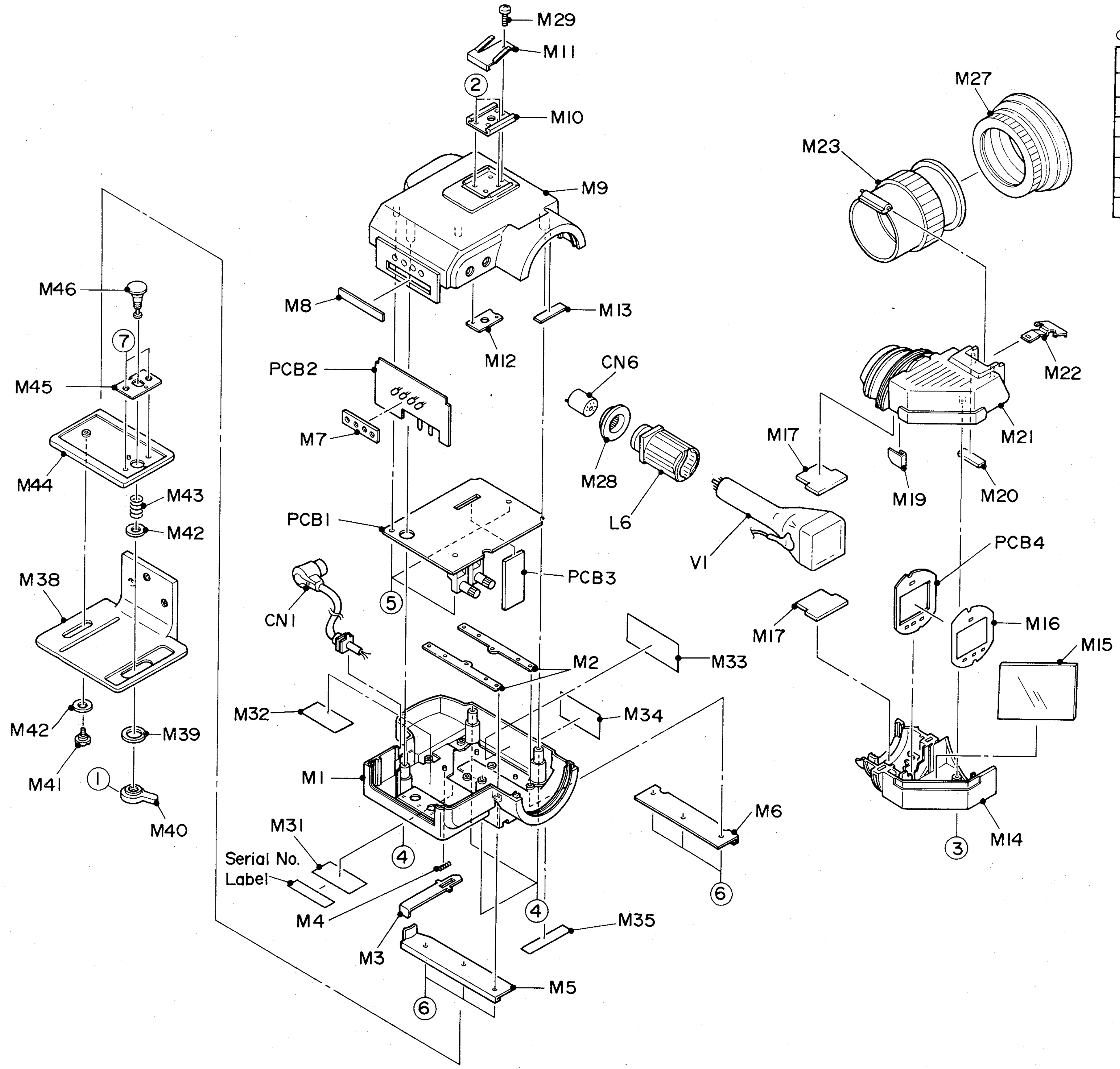
EXPLODED VIEW OF CAMERA ADAPTOR


CN5
⑪
PCB4 (MIC)
M13
CN4
⑤
M14
⑩
④
PCB6 (TALLY LED)
②
M9
JK2
⑦
M10
②
M13
D1
SW1
M11
M12
PCB3
①
CN1, 2
M27
M28
M29
⑧
③
M7
⑧
M5
M6
M13
M25
⑨
M2
CN3
JK1
M8
JK3
②
②
M2
M1
PCB7
②
PCB5
Serial No. Label
M4
M21
⑥
M17
M18
M19
④
M20
PCB2
M23
M24
PCB1
M31
M3
⑧
⑧
⑧
⑧
⑨
M32
M33
M22
③
M15
M16
⑤
M33

○ Numbers show screws.

No.	Screws	Description
①	XSB26+4FX	Binding Head Screws
②	XSB26+6FX	Binding Head Screws
③	XSB26+6FXK	Binding Head Black Screws
④	XSN26+6FN	Pan Head Machine Screws
⑤	XSS26+6FN	Flush Head Machine Screws
⑥	XYN26+6FX	Machine Screw and Washer Assembly
⑦	XSB26+8FX	Binding Head Screws
⑧	XSS3+6FXK	Flush Head Machine Black Screws
⑨	XSB3+8FXK	Binding Head Black Screws
⑩	XTB3+8JFN	Binding Head Tapping Screws
⑪	XSB4+10FN	Binding Head Screws

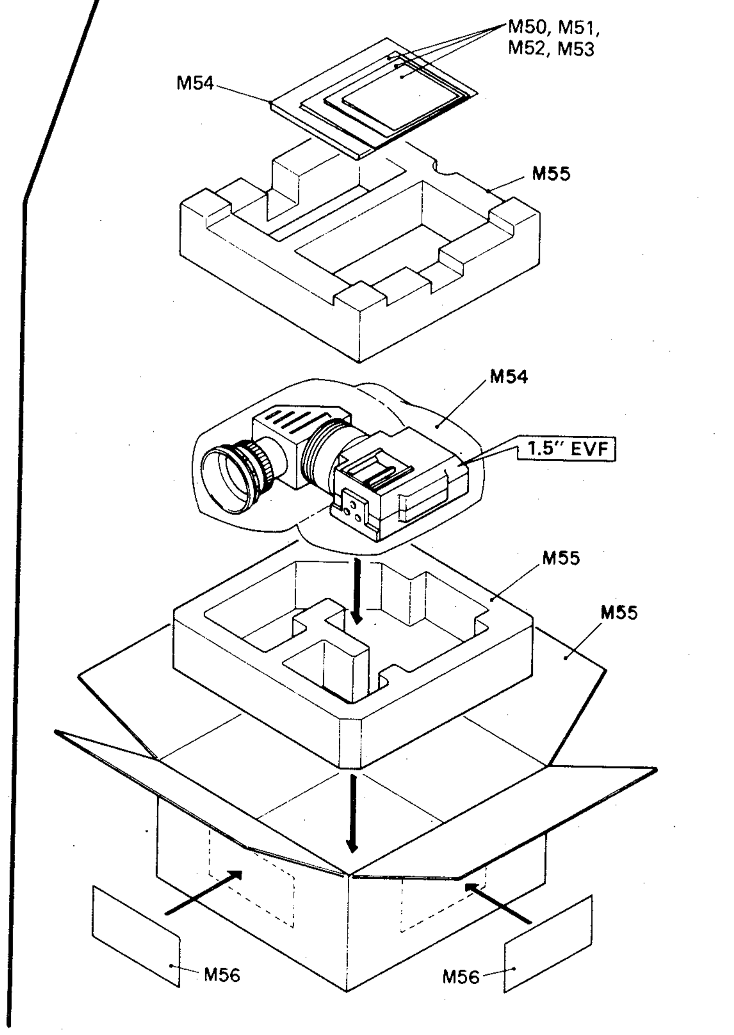
EXPLODED VIEW OF 1.5" EVF


M29
M11
②
M10
M9
M27
M23
M8
M12
M13
M46
⑦
M45
PCB2
M7
CN6
M28
L6
M22
M21
M17
M19
M20
M44
M43
M42
PCB1
PCB3
V1
PCB4
M38
⑤
CN1
M16
M17
M15
M2
M33
M34
M32
M42
M39
M41
①
M40
M1
M6
M14
③
M31
Serial No. Label
④
M4
M3
④
M35
⑥
M5
⑥

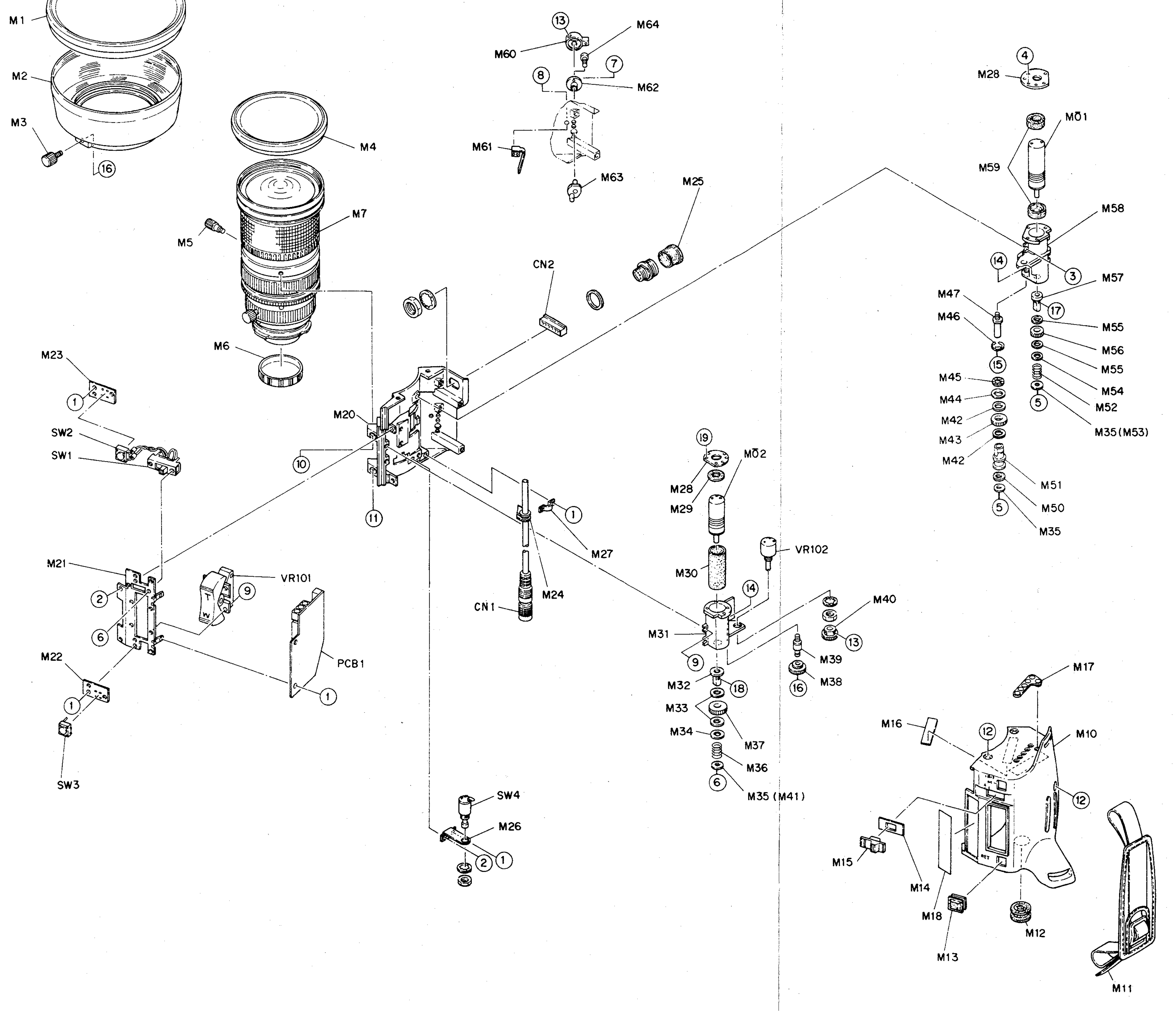
○ Numbers show screws.

No.	Screws	Description
①	XSN2+3FXK	Pan Head Machine Black Screws
②	XSS2+6FX	Flush Head Machine Screws
③	XTN26+25BFXK	Pan Head Tapping Black Screws
④	XSS26+5FXK	Flush Head Black Screws
⑤	XTB26+6BFX	Binding Head Tapping Screws
⑥	XSS26+10FXK	Flush Head Black Screws
⑦	XSB3+6FXK	Binding Head Black Screws

PACKAGING


M50, M51, M52, M53
M54
M55
M54
1.5" EVF
M55
M55
M56
M56

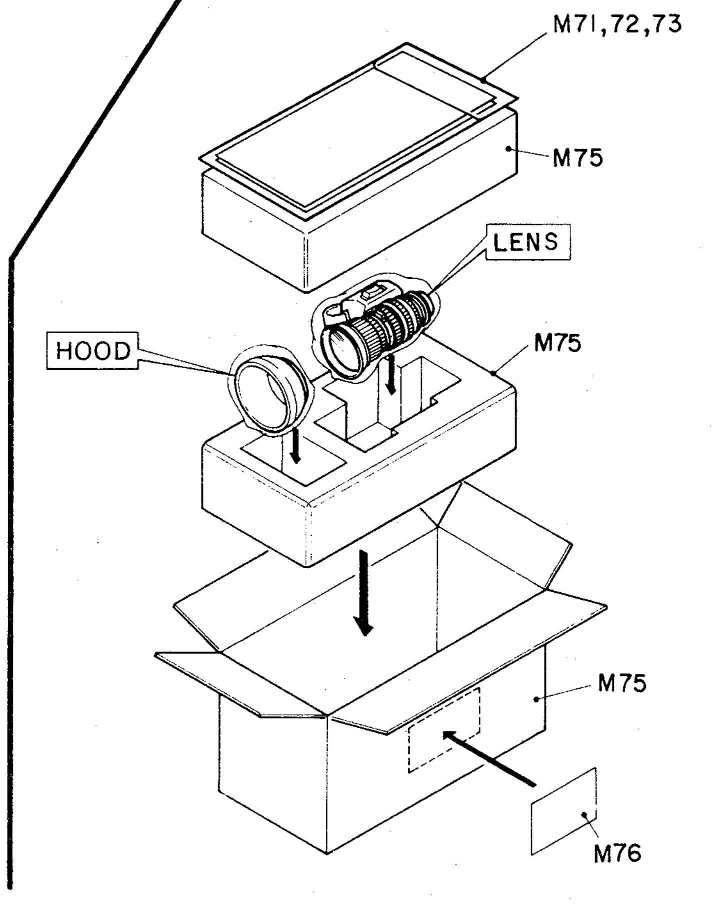
EXPLODED VIEW OF ZOOM LENS


M1
M2
M3
⑯
M4
M5
M7
M6
M60
⑬
M64
⑦
⑧
M62
M61
M63
M25
CN2
M23
①
SW2
SW1
M20
⑩
⑪
M21
②
⑥
VR101
⑨
PCB1
M22
①
SW3
CN1
M24
①
M27
SW4
M26
②
①
⑲
M28
MŌ2
M29
M30
VR102
⑭
M31
⑨
M40
⑬
M39
⑯
M38
M32
⑱
M33
M34
M37
M36
⑥
M35 (M41)
④
M28
MŌ1
M59
M58
⑭
③
M57
M47
⑰
M46
M55
⑮
M56
M55
M45
M54
M44
⑤
M52
M42
M35(M53)
M43
M42
M51
M50
⑤
M35
M17
M16
⑫
M10
⑫
M15
M14
M18
M13
M12
M11

○ Numbers show screws.

No.	Screws	Description
①	XA1–1200–309	Special Screws
②	XA1–1200- 409	Special Screws
③	XA1–1200–509	Special Screws
④	XA1–1200–609	Special Screws
⑤	XA1–1260–309	Special Screws
⑥	XA1–1260–409	Special Screws
⑦	XA1–3170–259	Special Screws
⑧	XA1–3200–209	Special Screws
⑨	XA1–7200–509	Special Screws
⑩	XB1–1300–801	Special Screws
⑪	XB1–1301–201	Special Screws
⑫	BS0–1215–020	Special Screws
⑬	XA6–1200–309	Slotted Set Screws
⑭	XB7–2200–209	Nuts
⑮	XD1–1106–222	Washer
⑯	XD2–1100–202	E Ring
⑰	XD3–1100–042	Pin
⑱	XD3–1100–052	Pin

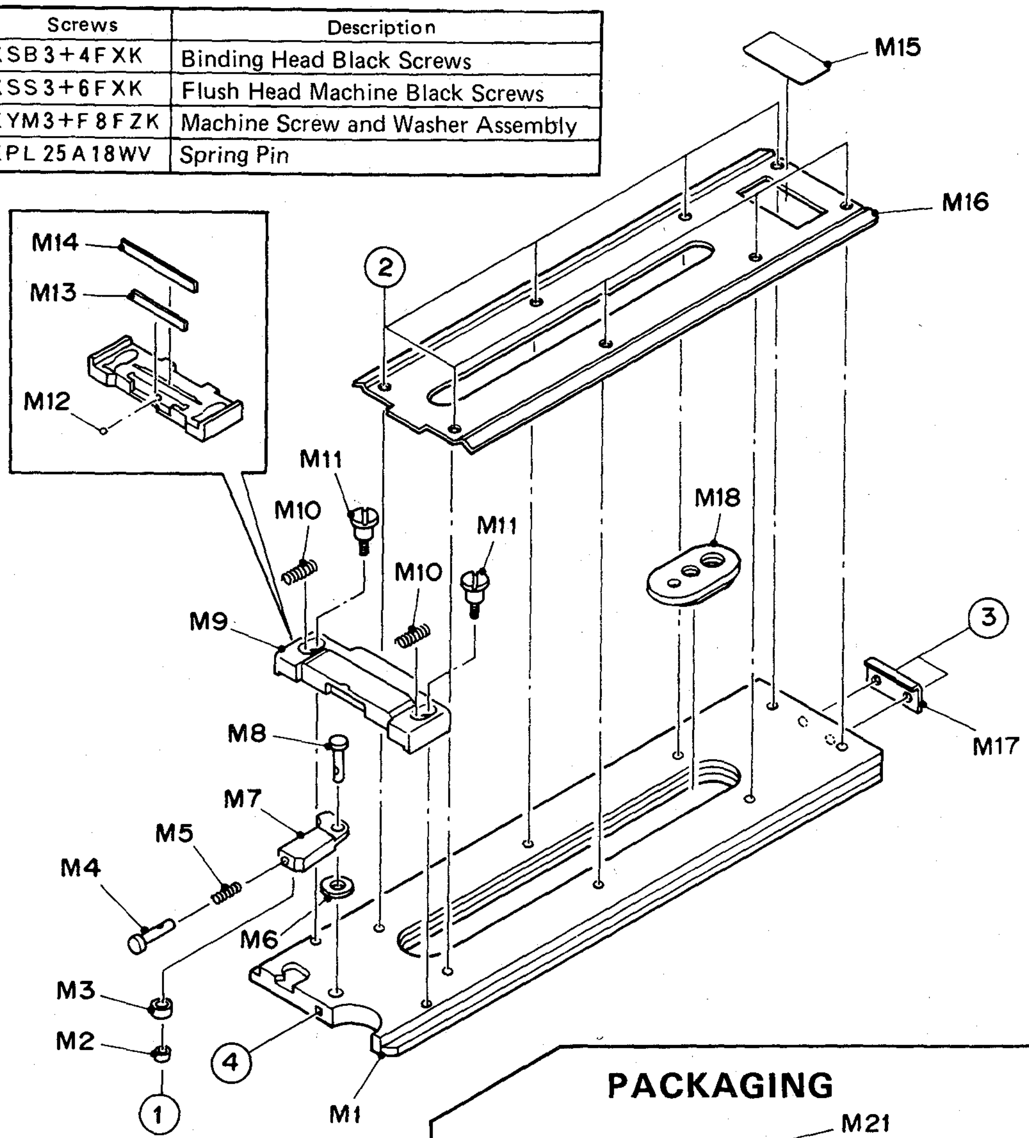
PACKAGING


M71,72,73
M75
LENS
HOOD
M75
M75
M76

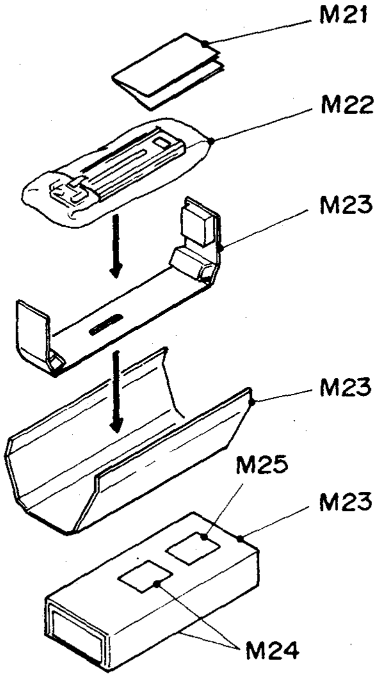
EXPLODED VIEW OF TRIPOD MOUNTING ADAPTOR

○ Numbers show screws.

No.	Screws	Description
①	XSB3+4FXK	Binding Head Black Screws
②	XSS3+6FXK	Flush Head Machine Black Screws
③	XYM3+F8FZK	Machine Screw and Washer Assembly
④	XPL25A18WV	Spring Pin


M15
M16
M14
M13
M12
②
M11
M10
M11
M10
M18
M9
③
M17
M8
M7
M5
M4
M6
M3
M2
④
①
M1

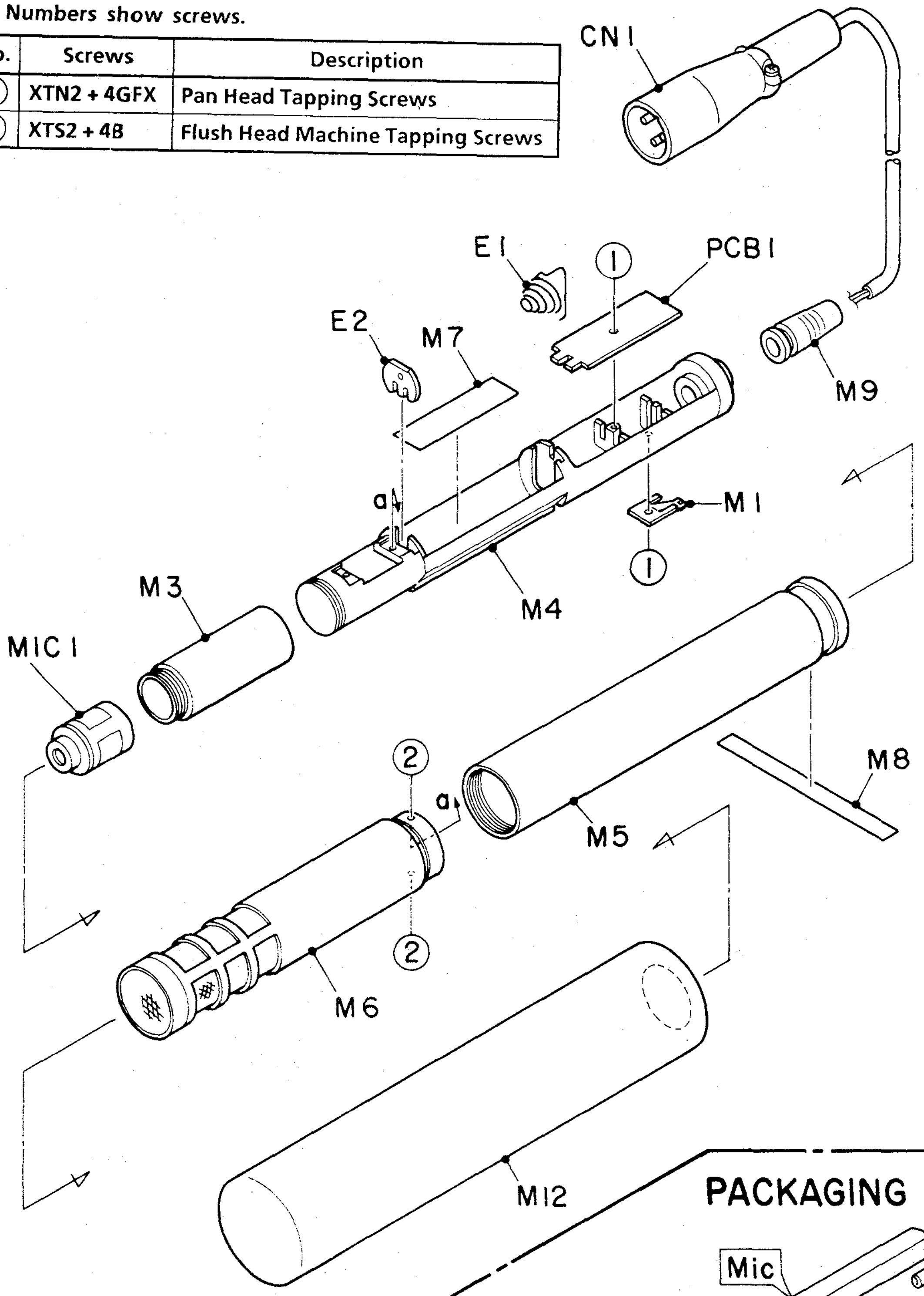
PACKAGING


M21
M22
M23
M23
M25
M23
M24

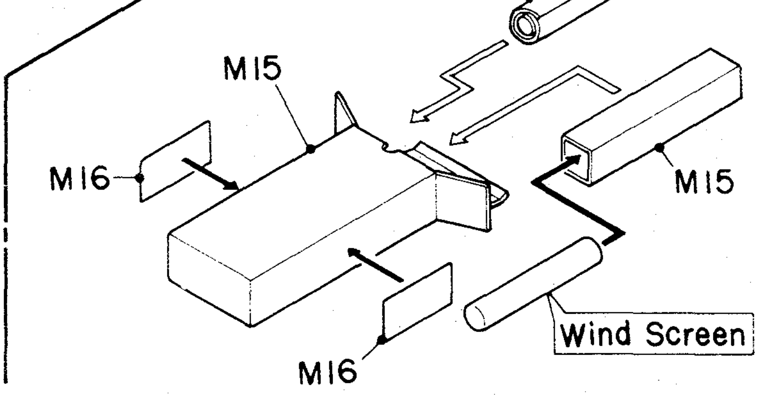
EXPLODED VIEW OF MICROPHONE

◯ Numbers show screws.

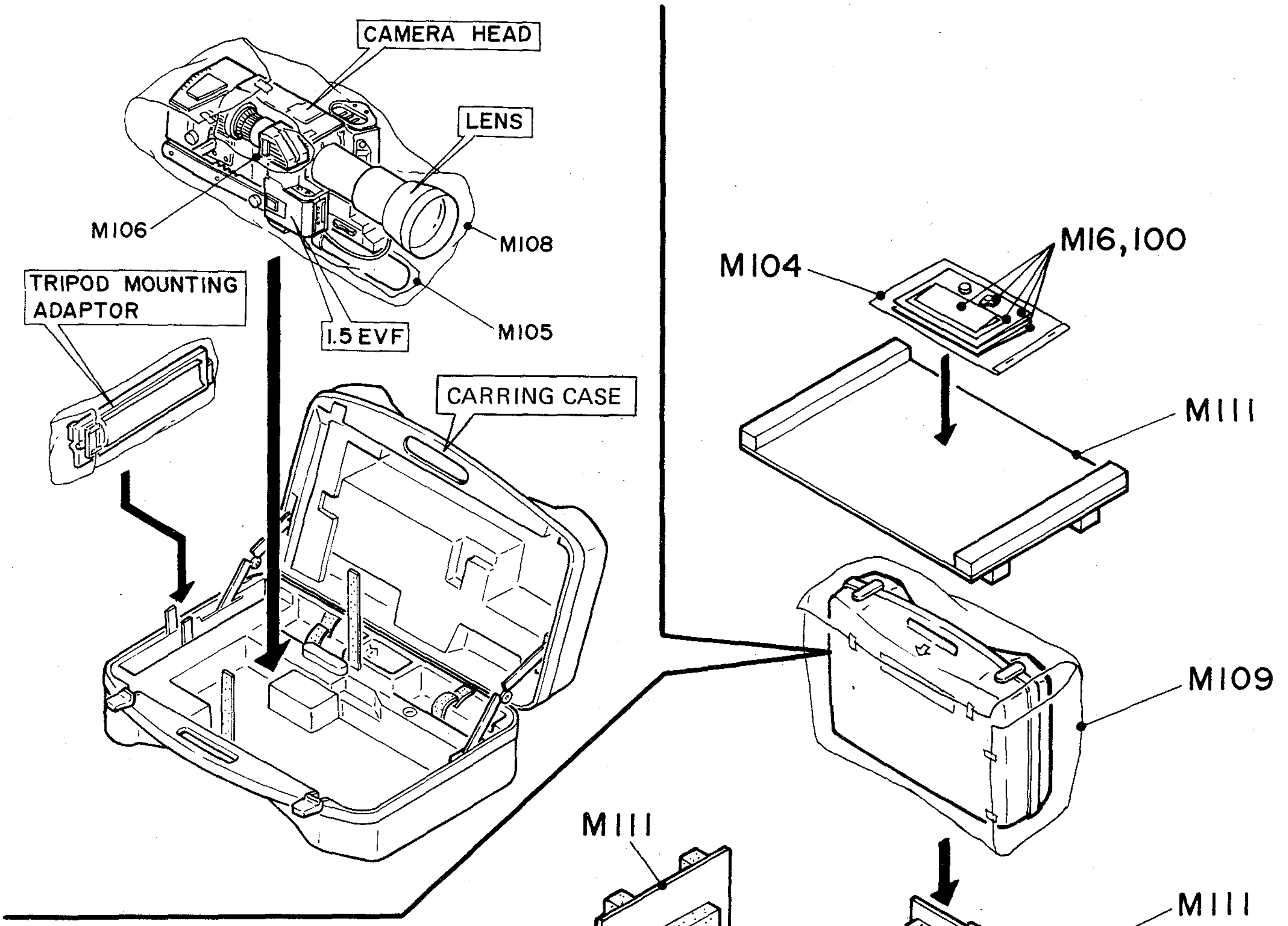
No.	Screws	Description
①	XTN2 + 4GFX	Pan Head Tapping Screws
②	XTS2 + 4B	Flush Head Machine Tapping Screws

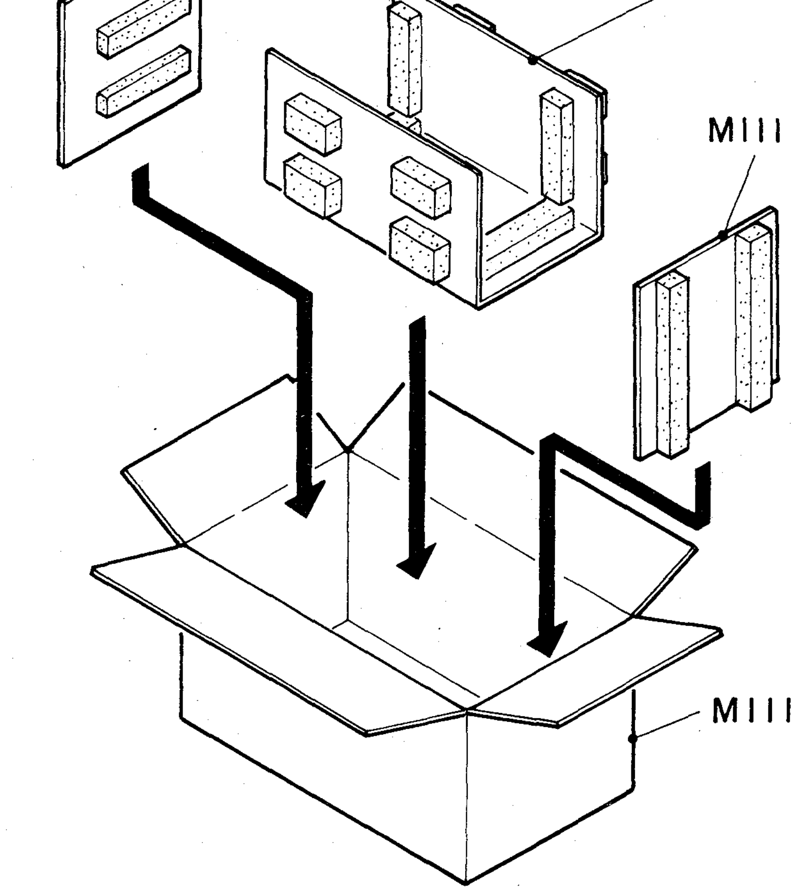

CN1
E1
①
PCB1
E2
M7
M9
a
M1
①
M3
M4
MIC1
②
a
M8
M5
②
M6
M12

PACKAGING

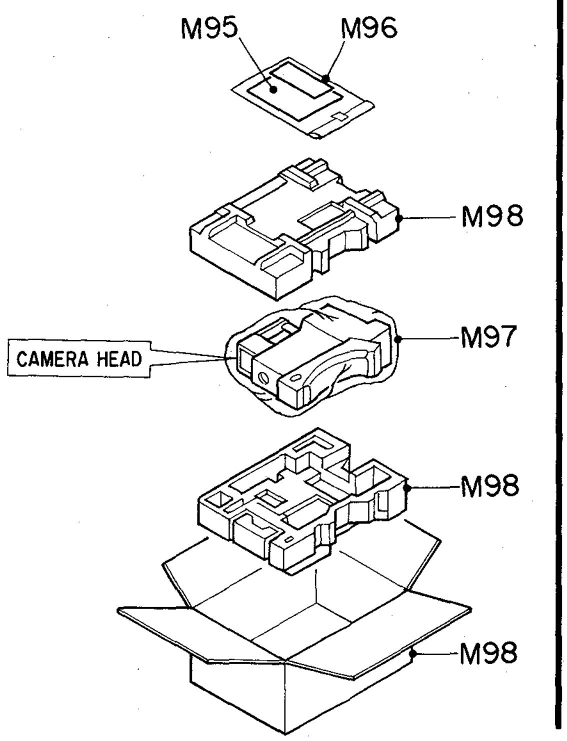

Mic
M15
M16
M15
Wind Screen
M16

PACKAGING OF WV-F200


CAMERA HEAD
LENS
M106
M108
M105
TRIPOD MOUNTING ADAPTOR
1.5 EVF
CARRING CASE
M104
M16,100
M111
M109
M111


M111
M111
M111

PACKAGING for WV-F200H


M95
M96
M98
CAMERA HEAD
M97
M98
M98